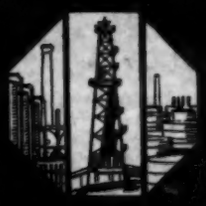


GROUNDS OF THE
INTERNATIONAL PETROLEUM EXPOSITION
TULSA OKLAHOMA

Though the processes of contact filtration are essentially measures of economy—the characteristics of the finished lubricants which they are capable of producing have contributed much towards their rather general adoption.

» » »

THE SHARPLES PROCESS
THE PROCESSES OF CONTACT FILTRATION
THE GYRO PROCESS
THE SAMPLITT
THE MIXITT

» »

MAX B. MILLER & CO., INC.
501 FIFTH AVENUE ◆ ◆ NEW YORK

When writing MAX B. MILLER & CO., INC. *please mention The Petroleum Engineer*

Petroleum Engineer

The Engineering Magazine of the Oil and Gas Industry

Volume 1 SEPTEMBER, 1930 Number 13

This issue contains

	Page
The Month's High Lights in Oildom — By J. L. Dwyer	31
Phillips to Use Butane-Fueled Engines and High-Speed Pumps on Gasoline Line — By J. H. Dameron	32
Topping Plant Handles Canada Crude — By F. R. Staley	35
Special Construction for Tank Battery — By Warren L. Baker	37
Vapor Tension Method for Testing Absorption Gasoline — By T. F. G. Boyd and Herbert J. Jones	40
Handling Mud Fluid in Hobbs Field — By Harold Vance	44
Wells Produced by Intermittent Gas-Lift Yield Encouraging Results — By K. C. Sclater	50
Causes of Errors in Natural Gas Measurement — By F. T. Wicks	65
Drilling Conditions in the Pettus Field — By Harold Vance	71
Construction and Drilling Conditions in Lake Maracaibo — By H. J. Woolslayer	73
Unusual Means of Water Source Development	78
Anti-Knock Motor Fuels — By Lazar Edeleanu and Wolfgang Grote	83
Use of Small Flow Lines to Build Back Pressure	87
Gas Engine Powered Pump Stations	89
Compact Arrangement of Equipment Necessary on Small Town Lots — By W. A. Sawdon	94
Gas-Lift Method in Deep Wells	97
Maintaining the Quality of Lubricating Oil in Service — By John M. McGregor	101
Richardson Refinery Handles Sulphur Crudes	104
Seminole Plant Installs New Stabilizing Unit	108
Determining the Butane Content of Gas Mixtures — By A. E. Krogh	111
Using Indicator Cards to Find Valve Troubles	114
Building Four-Line River Crossing	118
The Making of Hot Roll Mill Grease — By S. J. Caplan	121
Pressure Flow Studies of Petroleum — By Fred. W. Padgett	123
Handling Gas from Deep West Texas Well	126
Technical Aspects of Carbon Black Manufacture — By C. S. Dewey	128
Heating Coil Increases Capacity of Re-Run Still — By T. A. Pomeroy	135
Eliminating Hazards in Natural Gasoline Operations — By H. N. Blakeslee	138
Model River Terminal in Arkansas	142
Characteristics of Aviation Gasoline — By E. B. Bronte	184
Efficiency Applied to Pipe Storage	192
Blow-Out Equipment Service	196
Oil Field Machine Shop Adapted for Reconditioning Production Materials	204
Lead Soaps as a Constituent of Lubricating Greases — By A. R. Lange	207

REGULAR DEPARTMENTS

Pictorial Petroleum	165 to 180, inclusive
New Petroleum Equipment	146, 149, 151, 152, 154 and 156
Running Tour With Men in the Industry	158 and 161
Laugh With Barney	162
New Petroleum Patents	209 and 210
New Books of the Trade	200

SPECIAL NOTE: Each issue of The Petroleum Engineer is copyrighted. Any republication of the matter appearing in the magazine, either wholly or in part, is not permitted except by special authorization.

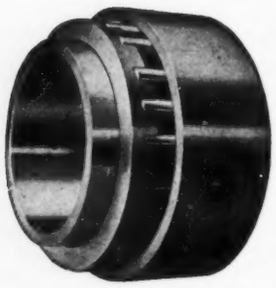
THE PETROLEUM ENGINEER PUBLISHING CO.

EXCHANGE BANK BUILDING TULSA, OKLAHOMA

C. MORRIS - - - - - - - *President-General Manager*

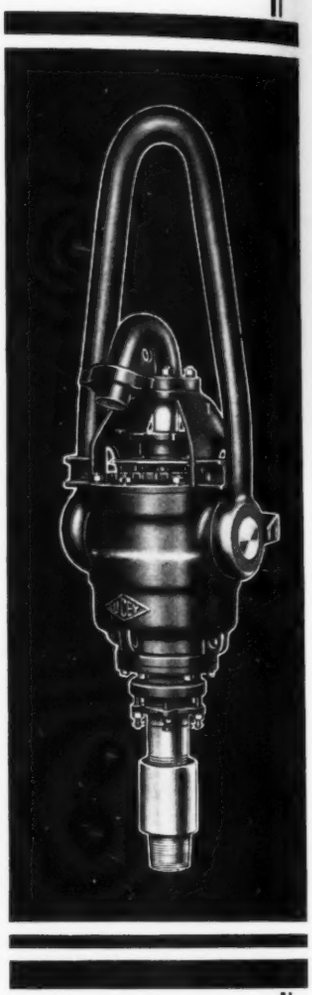
J. L. DWYER - - - - - - - - *Vice-President-Editor*
T. J. CROWLEY - - - - - - - - - *Vice-President*
W. T. BRYAN - - - - - - - - *Secretary-Treasurer*
W. L. LOVE - - - - - - - - *Advertising Manager*
K. C. SCLATER - - - - *Oil and Gas Production Editor*
J. H. DAMERON - - *Oil and Gas Transportation Editor*
F. R. STALEY - - *Refining and Natural Gasoline Editor*
WARREN L. BAKER - - - - - - - *Associate Editor*

They Answer the Demand for Better Heavy Duty Bearings
in these Lucey Products



MODERNIZATION *means* "American-ization"—when you think of the improvements of the last few years in most of the heavy duty performing drilling equipment. Consider Traveling and Crown Blocks, Swivels, Pumping Units, Draw Works and Hoists, Reverse Clutches—the whole parade of progress has advanced on American Bearings. Careful thought—ingenious design—American Heavy Duty Roller Bearings — that is the formula followed by the wise engineers who have furnished the industry with equipment more trustworthy than ever before.

AMERICAN ROLLER BEARINGS HEAVY DUTY



The New Lucey Heavy Duty "Stream Line" Traveling Block. Designed, "American-ized" and built for a working load of 200,000 pounds. The American Heavy Duty roller bearings are installed on a seven-inch diameter alloy steel shaft.

AMERICAN ROLLER BEARING CO.
PITTSBURGH, PENNA.

Frank M. Cobbledick Co.
1031 Polk St.
San Francisco, California

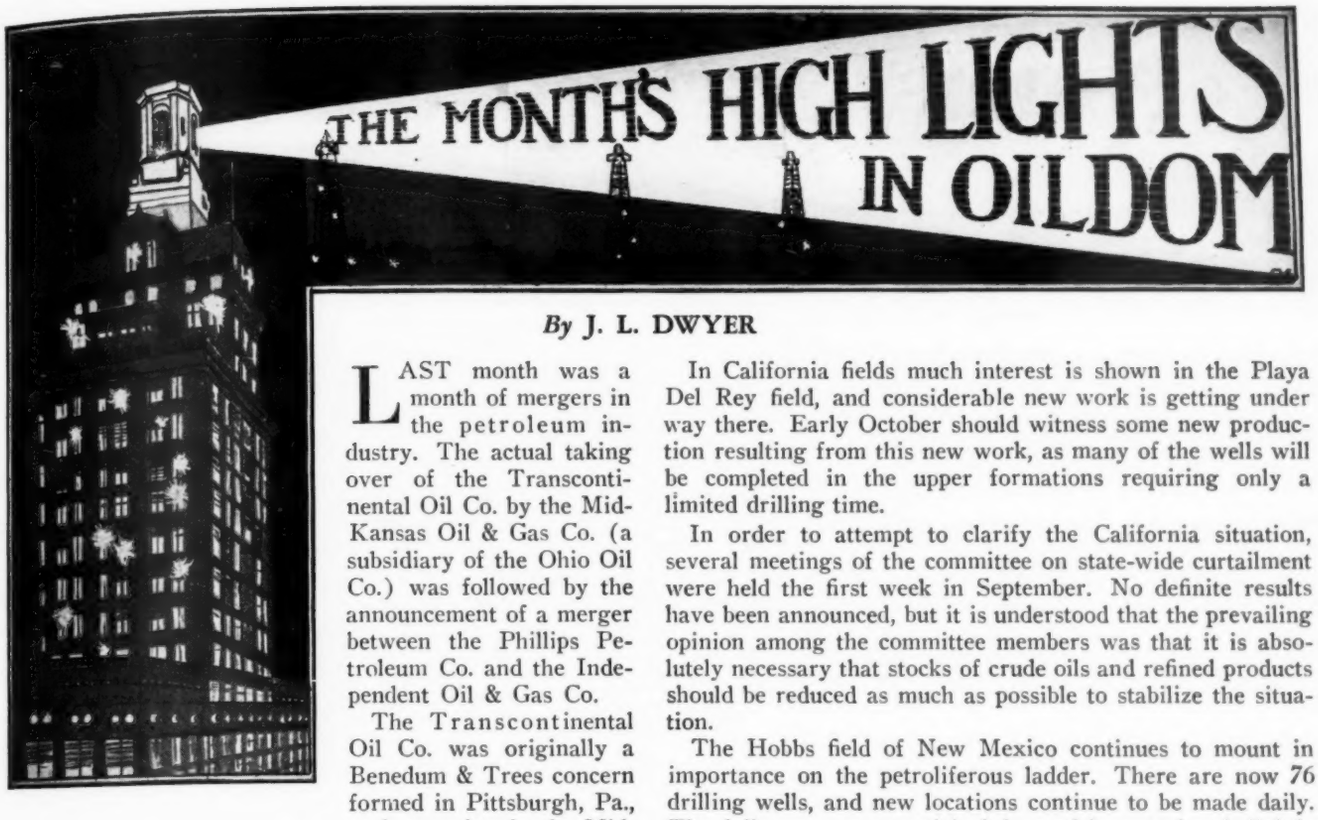
Pacific Coast Representatives

Edward D. Maltby Co.
321 W. Pico St.
Los Angeles, California

The New Lucey Rotary Swivel—Another handler of gigantic loads made to stand up under the terrific strains of deep well drilling and yet operate with the velvet smoothness characteristic of "American-ized" equipment.

AMERICAN HEAVY DUTY ROLLER BEARINGS

When writing AMERICAN ROLLER BEARING CO. *please mention The Petroleum Engineer*



By J. L. DWYER

LAST month was a month of mergers in the petroleum industry. The actual taking over of the Transcontinental Oil Co. by the Mid-Kansas Oil & Gas Co. (a subsidiary of the Ohio Oil Co.) was followed by the announcement of a merger between the Phillips Petroleum Co. and the Independent Oil & Gas Co.

The Transcontinental Oil Co. was originally a Benedum & Trees concern formed in Pittsburgh, Pa., and operating in the Mid-Continent fields for many years. Its first association with the Mid-Kansas Oil & Gas Co. came about when the concerns jointly discovered and operated the now famous Yates pool in Pecos County, West Texas.

The Independent Oil & Gas Co. was formed at Okmulgee, Okla., ten years ago by E. H. Moore and a group of associates. At first it was active only in the producing branch of the business, but later its scope was broadened to include refining and marketing of petroleum and its products, and a pipe line department was added. In a formal statement concerning the Phillips-Independent merger, Frank Phillips, president of the Phillips Petroleum Co., said: "The combined assets of the consolidated company will amount to $316,000,000, of which more than $103,000,000 has been charged to reserves of all kinds. The net cash and current assets of the consolidated corporation will amount to over $40,000,000.

In California fields much interest is shown in the Playa Del Rey field, and considerable new work is getting under way there. Early October should witness some new production resulting from this new work, as many of the wells will be completed in the upper formations requiring only a limited drilling time.

In order to attempt to clarify the California situation, several meetings of the committee on state-wide curtailment were held the first week in September. No definite results have been announced, but it is understood that the prevailing opinion among the committee members was that it is absolutely necessary that stocks of crude oils and refined products should be reduced as much as possible to stabilize the situation.

The Hobbs field of New Mexico continues to mount in importance on the petroliferous ladder. There are now 76 drilling wells, and new locations continue to be made daily. The daily average potential of the pool is now placed slightly above 300,000 barrels. The permitted output of the pool is 32,500 barrels daily. The daily potential production during the latter part of July was 160,000 barrels. Should Hobbs continue to display the same rate of increase during the next six weeks as it has during the past the potential will assume an alarming figure by November first. The importance of mud fluid in the rotary drilling operations in the Hobbs field continues to command much interest and has been the cause of an unusual amount of study and research.

Oklahoma City continues to show a decreased number of drilling operations, with prospects that drilling activity will show a permanent decline unless some new discoveries are found to give added area to the producing territory.

Legal difficulties of an unusual nature have resulted from the action of one operating company in the field to take exception to the rulings of the State Corporation Commission, and the jurisdiction of the Commission will in all probability be tested out in the courts.

Production and Refining Figures Furnished by the American Petroleum Institute

Crude Runs to Stills, Gasoline and Gas and Fuel Oil Stocks, Week Ending August 23. 1930

(Figures in Barrels of 42 Gallons)

DISTRICT	Per Cent Potential Capacity Reporting	Crude Runs to Stills	Per Cent Operated of Total Capacity Reporting	Gasoline Stocks	Gas and Fuel Oil Stocks
East Coast	100.0	3,588,000	84.2	5,555,000	10,622,000
Appalachian	91.8	626,000	76.0	1,324,000	1,014,000
Ind., Ill., Ky.	99.6	2,120,000	79.5	6,356,000	4,408,000
Okla., Kan., Mo.	89.3	1,810,000	62.7	3,157,000	4,860,000
Texas	90.4	4,085,000	81.9	6,169,000	10,439,000
Louisiana, Arkansas	96.8	1,174,000	64.0	1,356,000	1,849,000
Rocky Mountain	93.6	445,000	45.7	2,141,000	1,212,000
California	99.3	4,013,000	64.3	13,784,000	105,562,000
Total Wk. Aug. 23	95.6	17,861,000	72.4	39,842,000	139,966,000
Total Wk. Aug. 16	95.7	17,939,000	72.6	41,252,000	139,160,000
The Texas and Louisiana Gulf Coastal figures shown below are included above in the totals of their respective districts.					
Texas Gulf Coast	100.0	3,100,000	84.1	4,927,000	7,524,000
Louisiana Gulf Cst.	100.0	810,000	78.4	1,048,000	1,097,000

Daily Average Production

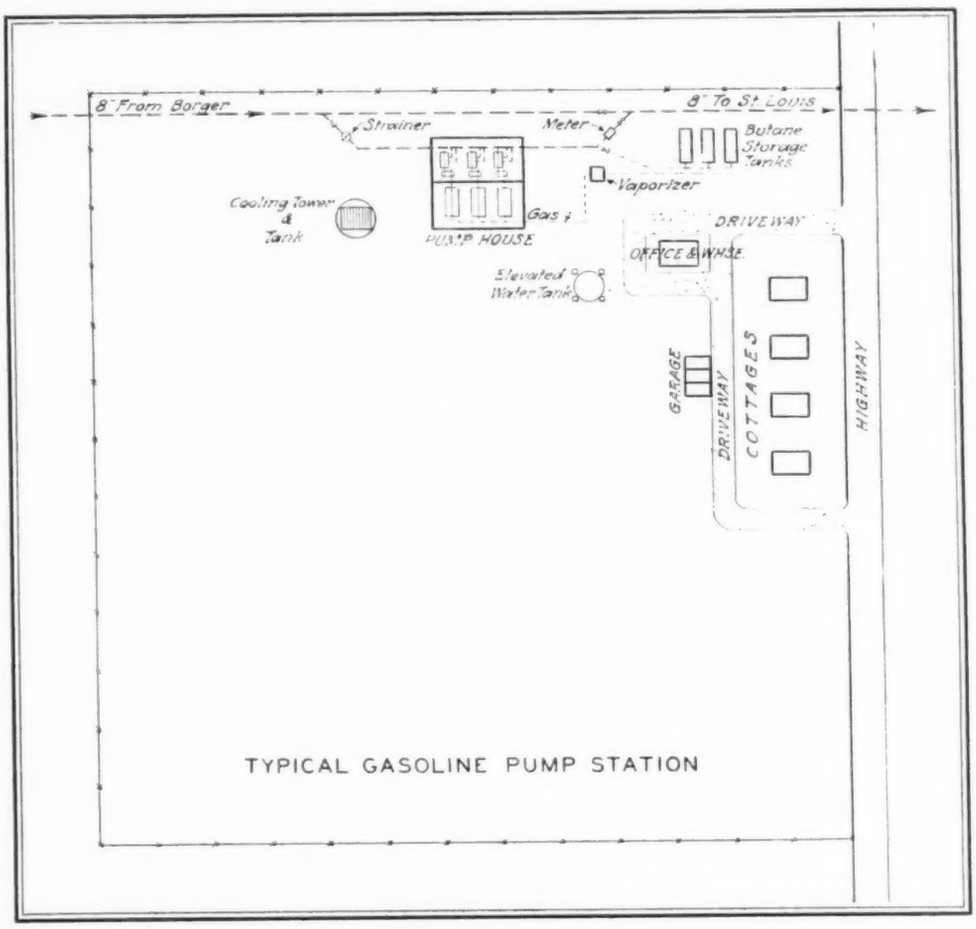
(Figures in Barrels)

	Aug. 23, 1930	July 26, 1930	Aug. 24, 1929
Oklahoma	566,950	566,850	727,350
Kansas	114,650	117,050	128,650
Panhandle Texas	100,050	96,400	133,850
North Texas	72,550	74,550	95,500
West Central Texas	52,750	55,400	58,500
West Texas	280,150	298,650	374,200
East Central Texas	39,700	40,900	17,950
Southwest Texas	94,000	77,350	78,200
North Louisiana	41,500	42,150	36,350
Arkansas	55,050	55,450	66,700
Coastal Texas	177,050	185,900	134,000
Coastal Louisiana	26,800	26,450	20,600
Eastern (not including Mich.)	117,000	126,500	106,500
Michigan	9,850	9,850	21,000
Wyoming	50,250	48,100	58,050
Montana	9,450	9,350	11,500
Colorado	4,450	4,700	7,000
New Mexico	50,600	42,200	2,550
California	607,700	610,900	887,900
Total	2,470,500	2,488,700	2,966,350

PHILLIPS to Use Butane-Fueled on Gasoline

WITHIN the last handful of years the trend of pipe-line construction and operation has marked a new area in the transportation branch of the petroleum industry. Larger diameter pipe built under newer methods is going into longer lines, some of which will be operated at higher pressures. The present year with its more than quarter-of-a-billion dollar pipe-line construction program well underway, is showing the way to still higher heights in engineering accomplishments in the construction of the several oil, gas and gasoline systems.

One of the most interesting as well as epochal of these new systems is the Phillips Pipe Line Co. gasoline carrier running northeast from the plains of the Texas Panhandle to St. Louis, Mo., with laterals at intermediate points.



TYPICAL GASOLINE PUMP STATION

Two engineering features, both of which are radical departures from present-day pipe-line practices, stand out prominently in the plans for the building of the 8-inch system. These are gas engine-driven centrifugal pump installations and the use of butane gas as a fuel for the engines. Butane, a recent newcomer in the commercial fuel field, is still very much of a waste product at refineries and natural gasoline plants where it is taken from refined products as a vapor. To handle it commercially it is compressed to a liquid and on this, its first major use as an industrial fuel, it will be slugged through the gasoline line, making it possible to operate stations on fuel taken from the line.

Heretofore there have been three generally accepted installations in pipe line pumping stations since steam stations were crowded into the background. In the order of their advent into transporting phase of the industry they are: Diesel engine-driven reciprocating pumps, motor-driven centrifugal pumps and motor-driven reciprocating pumps. Upon completion of this line will be another addition to the list—relatively slow-speed engines driving centrifugal pumps through step-up gears. This will mark the first efforts made on a major scale to drive high-speed pumps with either oil or gas engines.

The pipe-line construction work is well underway and at the present time the four gangs working in Oklahoma, Texas and Kansas are taking advantage of the ideal weather. In a short time, the contractors, Kelly-Dempsy Construction Co., will add two more gangs in order to speed construction. Over 1,000 men will be employed.

Around 700 miles of 8-inch, 24.696 - pound pipe will go into the main system. The entire line will be acetylene welded and the plain end pipe is made in 30- and 40-foot joints. It will be buried in a 34-inch trench and the priming coat applied at the mills will be covered with a cold application of coating and probably felt - wrapped in sections.

Present plans call for the erection of seven stations, approximately 100 miles apart, between Borger and St. Louis. These will be constructed of steel frame work with brick walls and steel deck roofs. An 8-inch fire wall, the full height of the building, will separate the engines and pumps. Gas storage will be built at only three stations at present, Wichita, Kan.; Harrisonville, Mo., and St. Louis. The remaining stations will have no storage tanks except three 32,800-gallon horizontal tanks for liquid butane. The refined products storage will consist of vapor tight tanks with floating roofs. Thus with no tanks floating on the line evaporation losses will be held to a minimum. In short, the station layout will be similar to that for an oil engine station.

Initially the line will have a daily capacity of around 18,000 barrels against a pressure ranging from 750 pounds to 800 pounds. Eventually, when additional stations are erected, the line will have a daily capacity of 30,000 barrels.

Engines and High Speed Pumps

Line

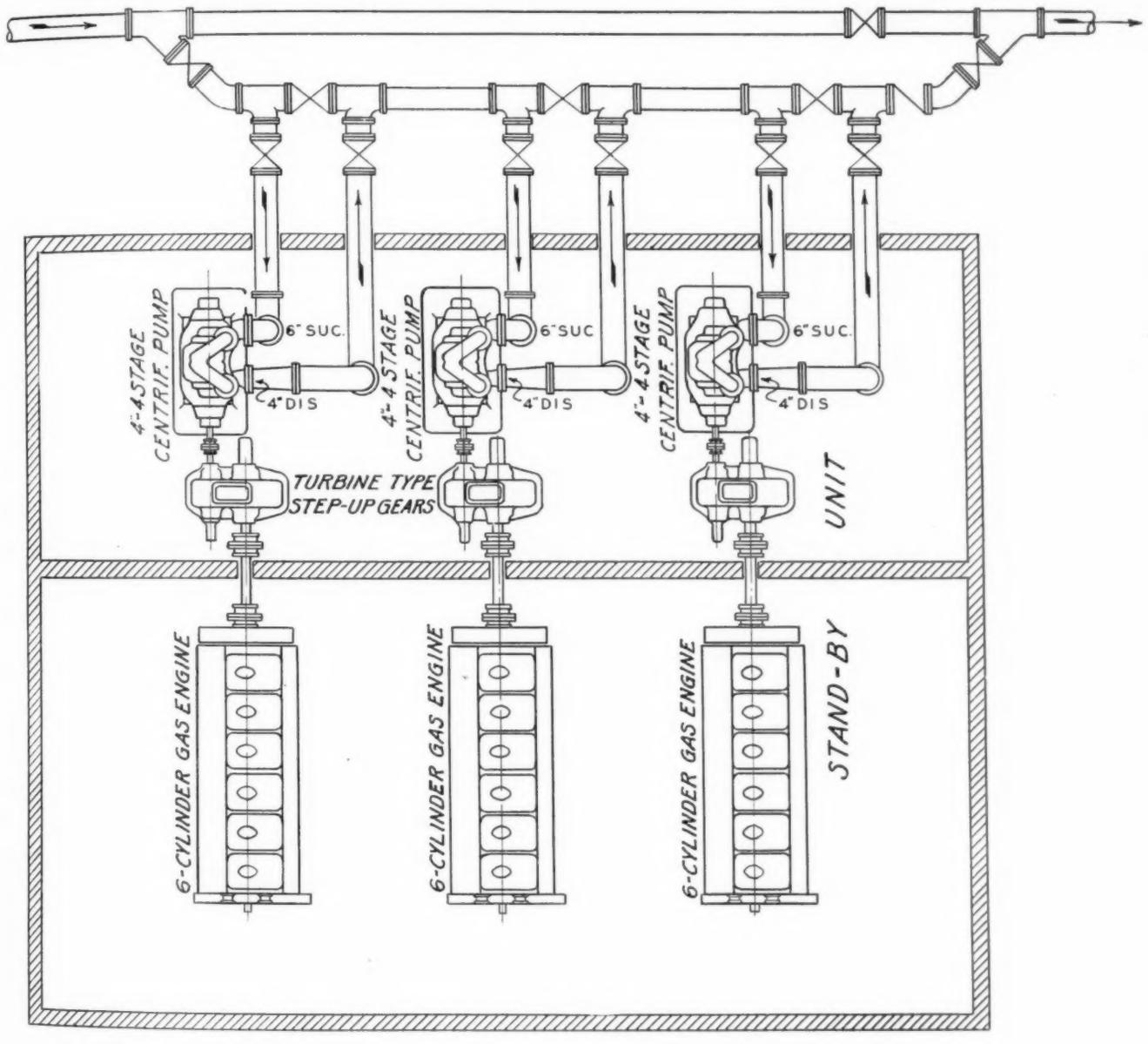
-:- *By* -:-
J. H. DAMERON

Each station will have three units, two in operation and one as a stand-by. Because of the type of prime mover there will be no stand-by losses. The engines will be six-cylinder, four-stroke cycle gas engines, burning butane as fuel and developing 260 horsepower at 360 r. p. m.

In design they are almost identical to oil engines. In place of a governor, a mixing valve with a six-inch intake air line and one-inch gas line will be installed. The head with its manifold was changed to be adaptable for gas fuel and may be changed back for fuel oil if desired.

The pumps will be driven through a turbine type gear increasers and the gear ratio will be approximately 9.68 to 1. Most of the pumps are four-inch, four-stage multiplex line pumps designed to operate at a speed of 3,450 r. p. m. against a line pressure of 750 pounds. Each pump will build up a pressure of 375 pounds. Another feature of the pumps are that all bearings are external and the top half of the case is bolted by having the bolts run almost entirely around each pair of impellers.

Several interesting features developed in connection with coupling the engine to the pumps through the gear increasers. Tests revealed that the pumps tend to run at a uniform velocity while gas engines inherently operate at a non-uniform rotation. Consequently rigid couplings cause the pump to try and force the engine to uniform rotation and if the engine is forced to uniform rotation the torque

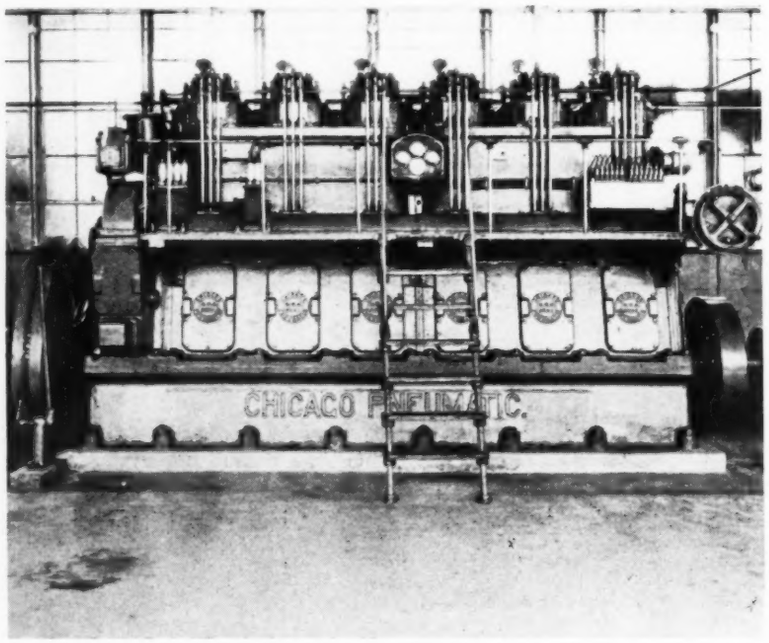


GENERAL ARRANGEMENT FOR GASOLINE PUMPING STATION

variation would be excessive and the pump shaft will be subjected to considerable variation in tortional stress. Eventually, after millions of cycles, the shaft would possibly fail as a result of the additional strain imposed, although amply strong for the work it is designed for.

To remedy this a type of flexible coupling will be used between the engines and the gears that will not only care for a small amount of misalignment, but will, through resilient elements, take up the non-uniform rotation of the engine and prevent it from reaching the uniform rotating pump. The coupling spring or rubber element is compressed a little more than normal on the firing stroke of the engine and then gives up the energy by expanding longer than normal on the suction stroke. This subjects the pump shaft to only a variation of torque limited by the engine fly wheel.

The shaft will extend through the fire wall and in a stuffing box and the coupling between the engine shaft and gear increasers will be of the type described. The coupling between the gear increasers and pump will be a flexible coupling. This coupling will be a floating shaft type which will be internal and external gear of the double engagement type. It is so designed that compensation for misalignment is accomplished without setting up whip or crank action. This avoids setting up destructive stresses in the shafts and bearings. It is built with purely mechanical flexibility, without flexible parts of any kind. This is to eliminate fatigue and resulting failure in parts subject to repeated bending tension or compression.



With some modifications, this type engine will be used on the Phillips line.

Considerable experimental work has been carried on by the Phillips Petroleum Co., parent company for the transporting subsidiary, which shows there will be very little contamination of butane with other products that will be shipped through the line. Roughly, nine days will be required for a shipment started through the line at Borger to reach the terminal. Sufficient quantity of the liquid gas will be slugged through periodically to permit each station to allow the butane to pass through for several hours before opening the tank filling lines. By following this practice it is expected the stations will be able to draw a non-contaminated supply from the line.

Most butane is obtained at natural gasoline plants and the raw gas going into the plants contains from 20 to 35 per cent by volume, butane. Recently commercial uses were found for the gas by liquefying it, storing it under pressure and selling it to domestic consumers. More recently industrial markets have been developed, but its use as a fuel for pipe line pumping stations marks its first use on a major industrial scale and incidentally further demonstrates its adaptability in other industrial fields.

Because of the high b. t. u. content, which is 3,200 per cubic foot or 102,040 b. t. u. per gallon, the fuel consumption of liquid butane will spread over a long period. Before going to the engines it will pass through a vaporizer and the pressure reduced to from four to six ounces. At the engine it will pass through the mixing valve before going to the fuel manifold and the mixture will be somewhere in the neighborhood of 30 parts air and one part butane gas, which will bring the b. t. u. content down to around 100 b. t. u. per cubic foot of gas.

To keep the fuel in a liquid state it will be necessary to hold a pressure on it constantly. The battery of three storage tanks will be located adjacent to the station and a three-inch lateral will come off the discharge side of the station and lead to the fuel tank header. When a slug of butane goes through, the station engineer will crack the valve on the filling line and fill the tanks.

Each tank will be a 10 by 40 horizontal vessel, designed for a working pressure equivalent to the vapor pressure at 105 degrees F. Tanks built for a working pressure of 80 pounds are generally used, made with flange quality steel, with an ultimate strength of 55,000 pounds per square inch.

These tanks will be located above ground on concrete pedestals and provided with safety valves set at below the safe working pressure. The liquid level in the tanks will be determined by means of gauge cocks constructed of steel and equipped with high pressure glasses protected by screens. No insulation will be put on the tanks, but each will be under an open type shed roof.

Lead lines from the fuel tanks to headers will come from both the bottom and top of each tank. Thus during the warm and hot months the fuel will be taken from the top and liquid from the bottom during cold weather. The fuel line will lead to a vaporizer outside the station building where the pressure will be reduced to ounces through regulators and to a vapor. When necessary the fuel will pass through a heat exchanger in connection with the vaporizer and which will get its heat from part of the engine exhaust water which will be by-passed through it.

Leaving the vaporizer and meter the vapor will flow to a four-inch header inside the station and from there probably through a one-inch line to the mixing valve. Another line will leave the vaporizer and lead to the belt line supplying the cottages with gas which will be used both for heating and cooking.

In operation the line will handle four grades of refined products. Batch shipments will be made of cracked gasoline with a gravity range of 55 to 58 A. P. I.; straight-run gasoline which will be around 60 A. P. I.; butane free natural gasoline which will be around 80 A. P. I. gravity and butane which is 114 A. P. I. gravity.

Topping Plant Handles Canadian Crude

By **F. R. STALEY**

THE refinery of the Regal Oil and Refining Co., Ltd., located in Calgary, Alberta, has a capacity of 1,000 barrels of crude oil per day. The crude is obtained from the Turner Valley and Vanalta fields. The refinery is operated under the supervision of F. J. Huff, general manager.

The plant was designed especially to refine the very light crude oil from Turner Valley. This crude is transported from the field to the refinery through a four-inch pipe line, which is 28 miles in length.

The crude oil produced in Turner Valley, Alberta, Canada, contains such a large percentage of light fractions or straight-run gasoline that it is usually called crude naphtha in the field. The gravity of this naphtha varies from 65 to 70 degrees A. P. I. Due to the high rock pressures of 2,000 pounds, and the light fractions in the oil, the gathering lines and separators are usually covered with frost due to the refrigeration effect caused by the expansion of the vapors. It is necessary to carry at least 1,000 pounds back pressure of the well to prevent the well from freezing itself up, which has been known to occur quite frequently in this field.

The crude oil or naphtha varies in color from water white to very dark, depending upon the percentage of heavy ends or residue which it contains. The crude does not contain any fractions suitable for lubricants. The refining or distillation is essentially a topping and fractionating operation to remove and separate the large percentage of light fractions. In the case of the water white crude it becomes yellow in color on standing.

Properties of the Crude

Gravity	65-70 A. P. I.
Color	22 Saybolt to dark
Sulphur	0.15%

Yields

Gasoline	400 E. P.	70-75%
Kerosene	42 A. P. I.	14-16%
Tractor distillate	32 A. P. I.	8-10%
Residue (fuel)	24 A. P. I.	5- 7%

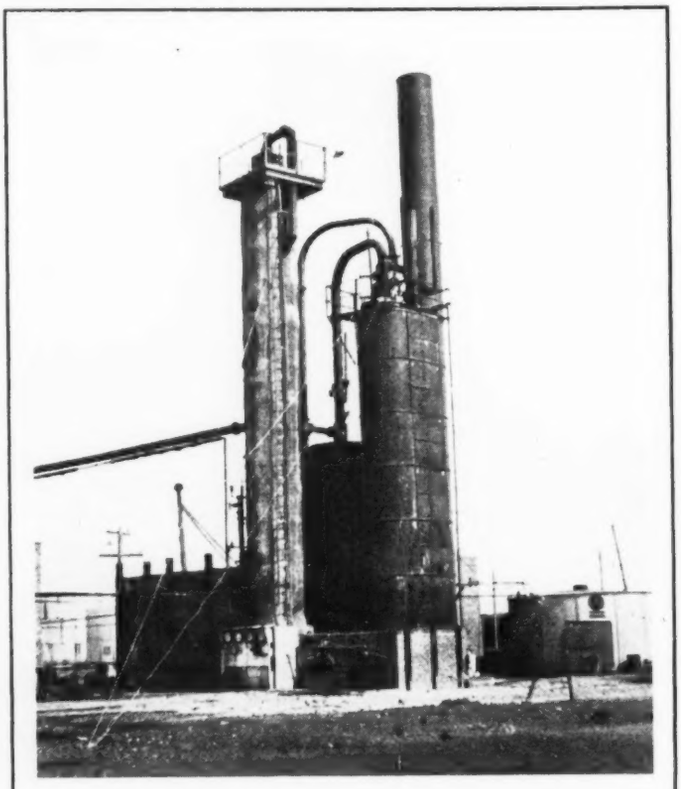
The distillation unit at the Regal refinery consists of a 1000-barrel pipe still. The crude is charged to this through

Loading rack at the Regal plant.

Top to bottom—Drilling wells for the water supply at the plant. One of the large storage tanks. Distillation unit at the Regal plant.

a series of heat exchangers and from the still the hot oil enters a plate type evaporator, with a definite quantity of live steam. The vapors pass through a tubular condenser (against water) which acts as a knock back tower and then enter a bubble tower, where they are fractionated into a 400 degrees F. end point gasoline having a 65 A. P. I. gravity, a 40-42 A. P. I. gravity kerosene distillate, and a tractor distillate which is extensively used as tractor fuel in the wheat fields of Alberta. The residue of approximately 24 A. P. I. gravity is sold for fuel oil. The fractionating equipment is very efficient and flexible.

Very little corrosion is encountered in refining equipment with this crude. However, what little corrosion does occur takes place in the run-down and vapor lines of the distillation unit. The gas obtained in Turner Valley contains considerable hydrogen sulphide, but the sulphur content of the crude is relatively low.



Fractionating tower and evaporator.

Treating

The gasoline is treated in a closed, continuous system, using sodium hypochlorite as the reagent. After treating it is water-washed. The treated gasoline passes the copper strip corrosion test and is sweet to the doctor. The sulphur content is very low.

The kerosene is treated in a lead-lined batch agitator. It requires about three pounds of 66-degree Be sulphuric acid per barrel for treatment. It is then water-washed and sweetened with caustic soda. The finished kerosene is water white and has an open cup flash of 130 to 150 degrees F.

The tractor distillate cut is not treated. It has a gravity of about 32 A. P. I. and has a minimum open cup flash of 180 degrees F.

The chemical treatment of the various fractions is comparatively simple and does not present any difficult problem. It is only necessary to sweeten the gasoline, while the kerosene distillate is treated with sulphuric acid in an open agitator. Due to the low gum and sulphur content of the gasoline, it can be readily treated with Ethyl fluid to produce Regal Ethyl gasoline. There has been an ever-increasing demand for this product during the past year. The tractor distillate is not treated. Large quantities of this product are consumed by the farmers. The refineries in Alberta and Montana manufacture this as a standard product.

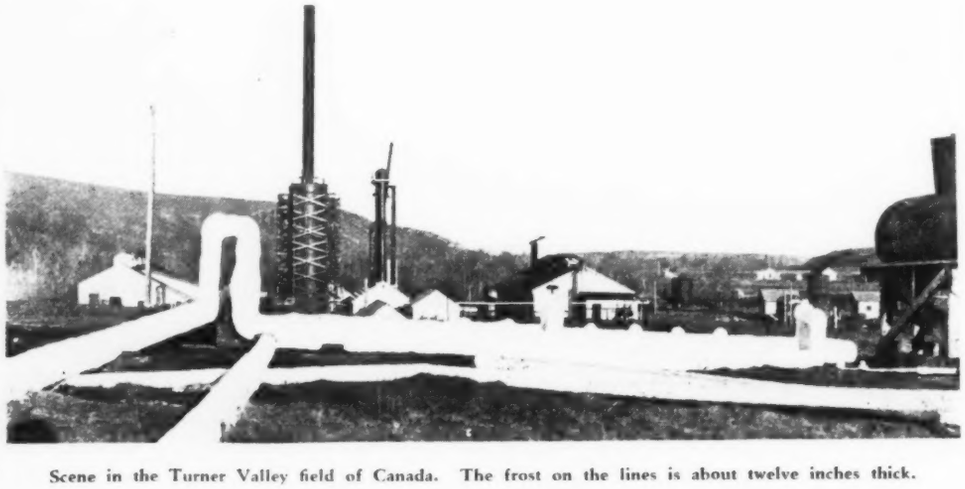
The company ships most of its products in its own tank cars, but has a bulk plant at the refinery for trucking gasoline to its own service stations in the city of Calgary and the nearby territory.

A certain percentage of the 400 end point gasoline is treated with Ethyl fluid to make Regal Ethyl gasoline. This gasoline required from 2 to 2.2 cubic centimeters of fluid per gallon to meet the Ethyl standard. The gum content of this gasoline is very low.

At the present time the city water supply is used at the plant, but the company is drilling two shallow wells at the refinery to supply water. These wells will be about 125 feet deep.

Steam for the refinery is generated by two 150-horsepower water tubular boilers. The boiler feed water is given a lime soda treatment. The boilers are fired with fuel oil produced at the refinery. Steam is used in the distillation unit and for the pumps in the plant.

No lubricants are made at the refinery and all the products of this nature are shipped in from another plant of the company to the refinery warehouse, which supplies Regal service stations located in Alberta. Large quantities of tractor oil are consumed in this territory.



Scene in the Turner Valley field of Canada. The frost on the lines is about twelve inches thick.

River Conditions Make Advisable

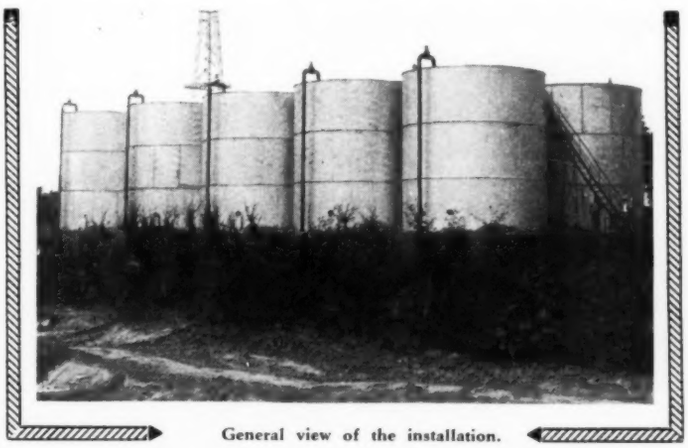
Special Construction *for* Tank Battery

By **WARREN L. BAKER**

ANDERSON-PRITCHARD PETROLEUM CORPORATION has recently completed some very fine stock tank batteries in the lowlands lying along the banks of the Canadian River in the north end of the Oklahoma City oil field. These tank batteries have several construction ideas that cause them to be particularly suitable for use in the overflow area.

The principal features of the tank batteries, in addition to ease and quickness of erection and economy of installation, are the raising of the foundation above flood level, and the flexibility of all connections to allow for settling.

The Canadian River lowlands that are now an important part of the active development at Oklahoma City have demanded many novel construction features to meet the unusual conditions in the region. The primary factors that must be met in erecting any unit, whether it be a rig, tank battery, pump station or what not, are the flooding of this region during rainy seasons and the shifting sandy soil that composes the surface of the district. Because of these conditions very careful attention must be given to construction plans in the territory—if they are to be adaptable for permanent service.



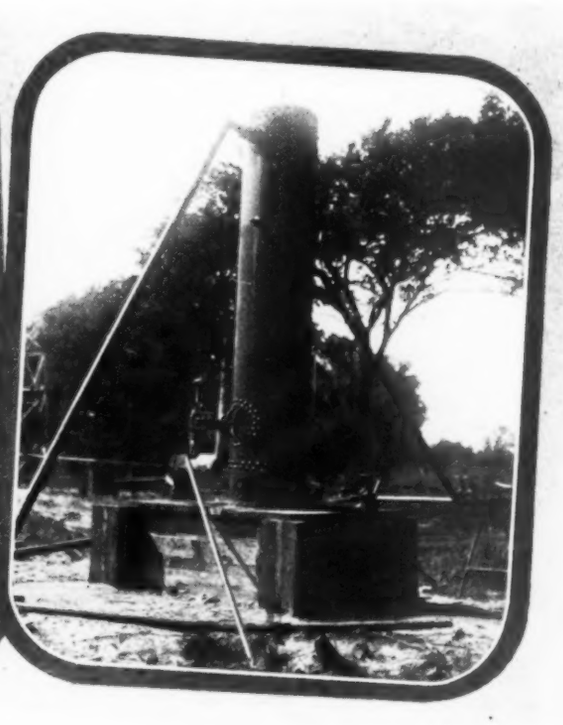
General view of the installation.

In order to illustrate more clearly the methods of constructing these batteries take one installation, the latest one since it has several new ideas, and go through the steps taken in its construction.

This battery covers an area of 56 by 160 feet, which has been raised five feet above the ground level, or sufficiently high to be above the flood level of the river. This raised portion now has ten 1,500 three-decked tanks erected, and room for two more.

The elevating of the foundation was accomplished without heavy costs. Posts, ten inches in diameter, and seven feet in length, were driven two feet in the ground, surrounding the area. This was then enclosed with heavy timbers, placed on the inside of the posts so that the outward thrust caused by the weight of the tanks would be absorbed by the posts. Three-quarter inch sucker rods were run across the enclosure from one post to its corresponding post, along both the length and width of the foundation. Two sucker rods were used on each post. These were placed at different heights. The upper one was placed slightly more than a foot from the top while the lower one was about two feet below. These rods extend

Looking down side of battery; showing flow line and riser hook-up.



Raised separator on Anderson-Pritchard lease.

through the posts to the outside, where large nuts and washers hold them in tension. The enclosure was then filled in with earth to the top.

The lining of the battery site with timbers serves the purpose of holding the filled in earth in place and preventing its washing away and settling to the sides. The network of rods gives additional rigidity and strength to the foundation in that it prevents the posts from giving way.

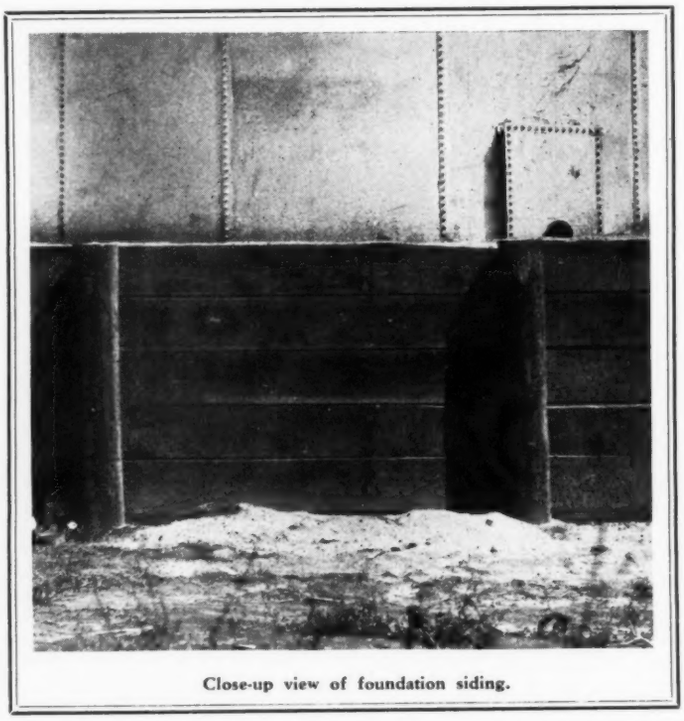
It is expected that this type of foundation will, in time, settle somewhat. This condition, therefore, had to be met and provided for, or there would result breakage in the flow lines. All connections and flow lines had to be of the most flexible equipment to overcome this condition. Thus far, there has not been a single break or leak in any of the lines or connections.

F. C. Letner, general superintendent of the Anderson-Pritchard Corporation, conceived the idea of constructing the tank batteries in this manner. The success of the idea has been so great that he is very proud of his installations, as is C. M. Fitch, farm boss for the same company in the region.

The inlet flow line has been laid to surround entirely the battery site. It is along the surface of the raised foundation, and made of six-inch drill pipe. An inlet tee has been placed on both ends of the installation, which permits the use of both, or of only one at a time. Risers to the top of the tanks were constructed vertically along the tank sides from the flow line. Each riser is also a six-inch pipe, and is equipped with a valve for shutting off or starting the flow into individual tanks.

Another feature of the method of laying the flow lines is the arrangement of the tees so that any one of them may be taken out at any time without disturbing any other connection or the use of the tank battery, since the flow line surrounding the battery permits the sending of the oil in any direction. A valve has been placed on each side of each tee so that the flow can be shut off at this point, while the tee is being removed and replaced.

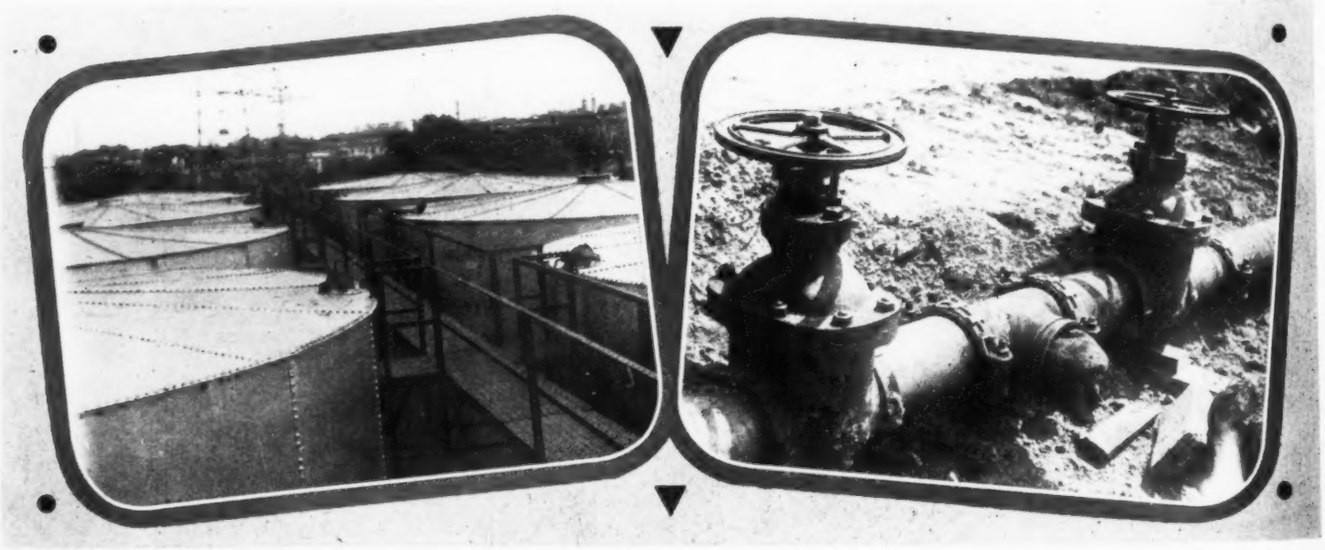
Unusual working time was made on the installation of these units, due mostly to the ease of handling the equipment worked with. It required six men about two days to lay the ground lines, erect risers and make all connections necessary for the battery to be put into service. On one unit the risers to five tanks and other connections were installed complete in one hour's time by a crew of six men.



Close-up view of foundation siding.

These tank batteries will probably be subjected to considerable hardships during the coming winter, when the waters from the Canadian River will probably surround the batteries any number of times, but with the construction principles used they are expected to withstand these destructive forces, particularly much better than a tank battery set right upon the easily eroded surface soil. The flexibility of the connections and flow lines will be tested to the utmost, but as they have withstood the settling of the filled in area and as the fill will practically have settled to its maximum by winter, the Anderson-Pritchard men anticipate no trouble from foundations settling.

Much interest has been displayed by other companies operating in the river bottom area in the novel idea of Mr. Letner. Now that the foundations have been tested to the point of practicability several other companies are planning to erect similar type installations of tank batteries.



Top view of the tank battery.

An inlet tee before having flow line connected.

EAST — WEST — NORTH — SOUTH

DRESSERS

Long distance pipe lines shooting out to all points of the compass . . . far-away communities getting natural gas for the first time . . . higher and higher pressures . . . flexible joints that remain *permanently tight* under all conditions of service — DRESSER COUPLINGS insuring uninterrupted service with minimum maintenance.

S. R. DRESSER MFG. COMPANY
Bradford » « Pennsylvania

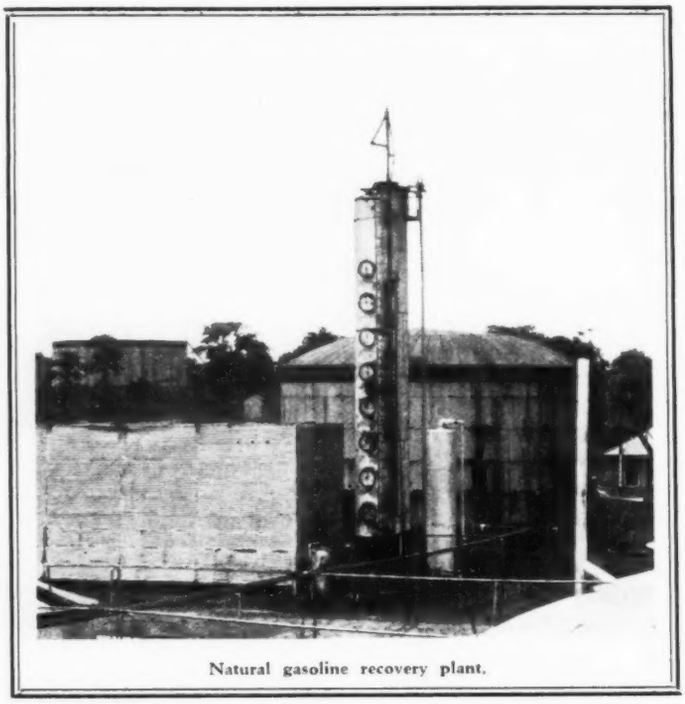
DRESSER COUPLINGS DOMINATE

When writing S. R. Dresser Mfg. Co. *please mention The Petroleum Engineer*

Recently Developed Vapor Tension Method *for* Testing Absorption Oil

By T. F. G. BOYD *and* HERBERT J. JONES, *Gas Department, Union Oil Company of California*

THE absorption of natural gasoline hydrocarbons in an absorption plant is essentially a vapor pressure phenomenon. The extraction of natural gasoline from the gas is accomplished by an intimate mixing of absorbing oil and gas within an absorber. In order to effect efficient extraction the absorbing oil must be practically free of the components to be extracted from the intake gas. The serious losses occasioned by very small percentages of these components remaining in the lean oil has been very forcibly pointed out in a paper by Mr. Alois Kremser recently read before the California Natural Gasoline Association. Mr. Kremser also indicated that an accurate determination of the vapor pressure of the lean oil may be used to predict the absorption efficiency of the absorbent. Modern plants are capable of maintaining lean oils having vapor pressures not exceeding 5 mm. However, numerous plants are still being operated that circulate oil having vapor pressures considerably above this value. In either case a dependable method of determining the lean oil vapor pressure is of extreme importance in order to obtain the most production with the equipment available, as constantly fluctuating conditions render it quite imperative that a close check be kept on the operation of the distillation equipment. Various types of apparatus have been used by the industry as an aid in plant control. The most favored apparatus embodied the method of calculating the vapor pressure of a lean oil by the increase in volume of a vapor space containing a known volume of air while the apparatus was maintained at atmospheric pressure. However, unavoidable errors were caused by the presence of varying amounts of both air and water in the oil, and in this apparatus it was not possible to eliminate the variable effects of this contamination.



Natural gasoline recovery plant.

A new method for determining the vapor pressure of lean oil has been developed by certain members of the gas department of the Union Oil Company of California. This apparatus indicates the vapor pressure of the lean oil, at any desired temperature, in millimeters of mercury absolute on an open end manometer. By means of this apparatus a method has been developed which is thought to eliminate, from the vapor pressure determina-

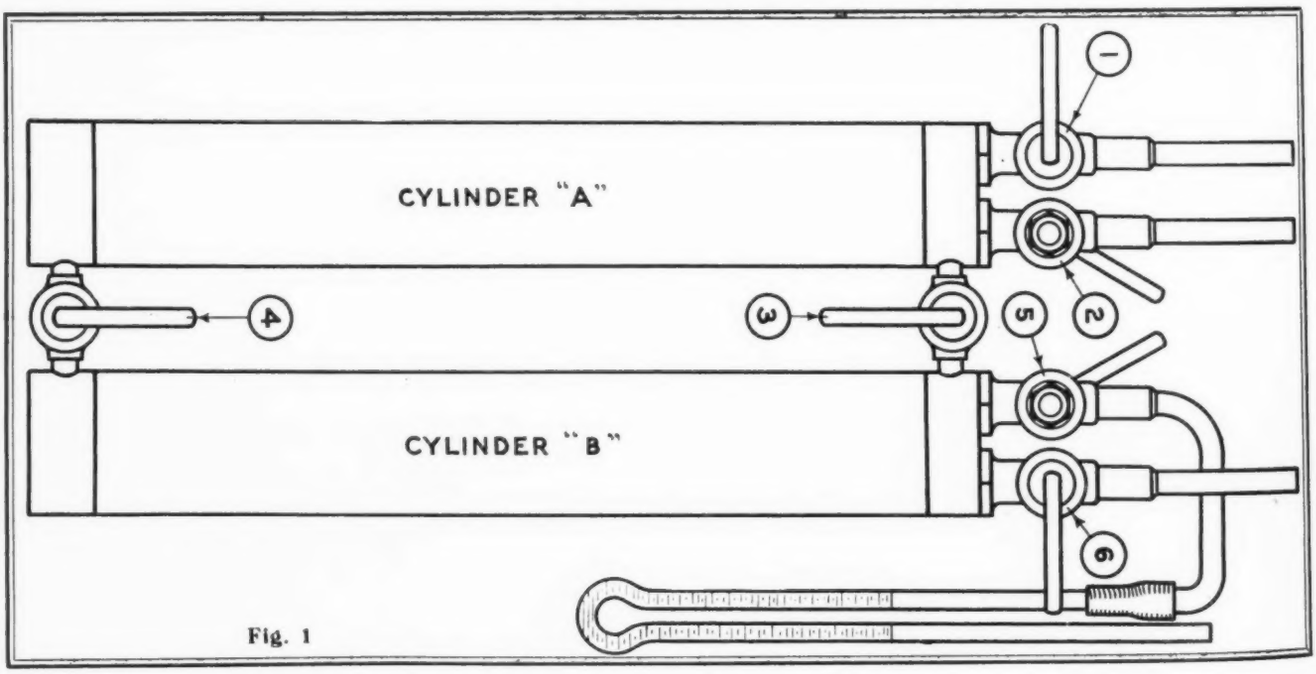
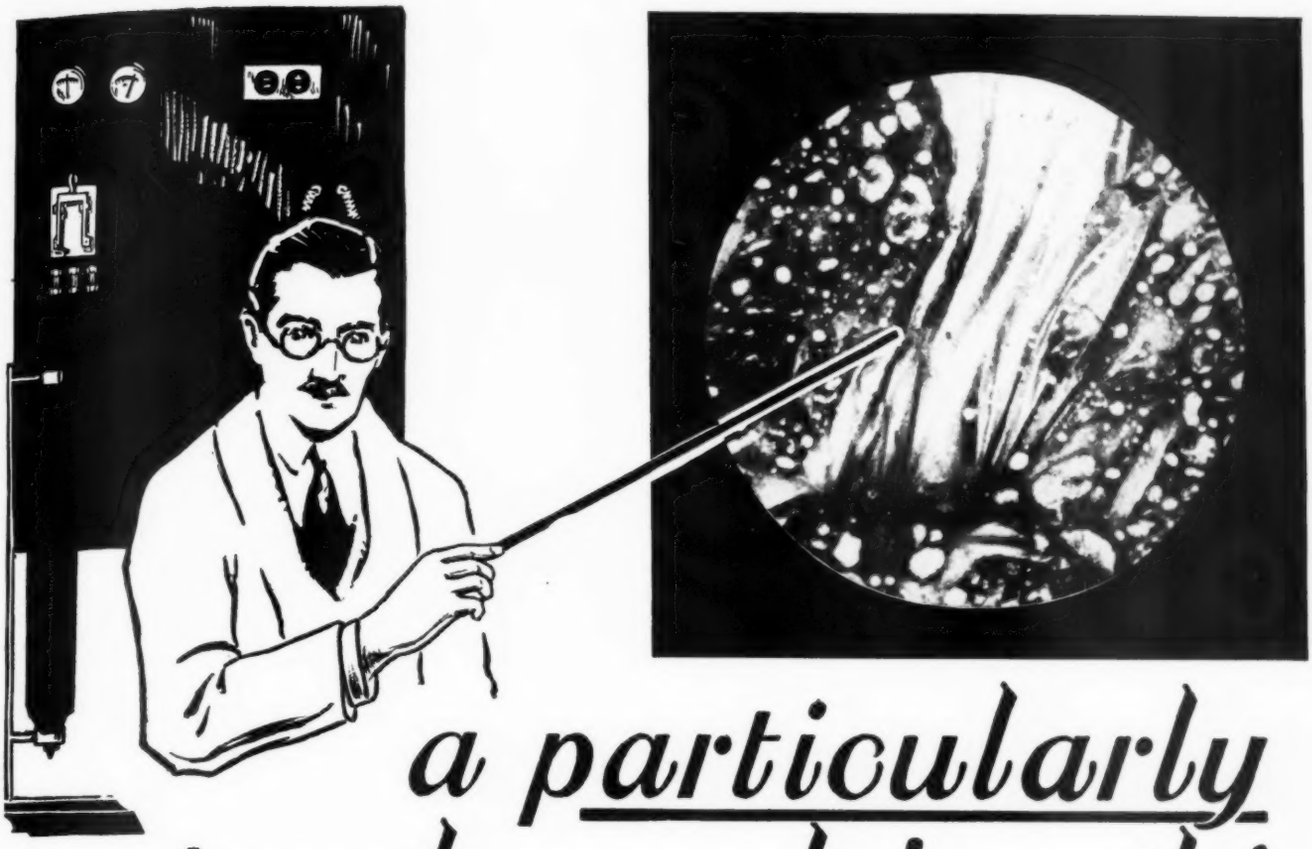


Fig. 1



a particularly tough emulsion, this

This specimen of crude—predominating small particle size .00056-inch—contains collodial material, a small amount of sediment and a very "tight" or tenacious emulsifying film—the type that never breaks of its own accord, even though allowed to stand over a period of years.

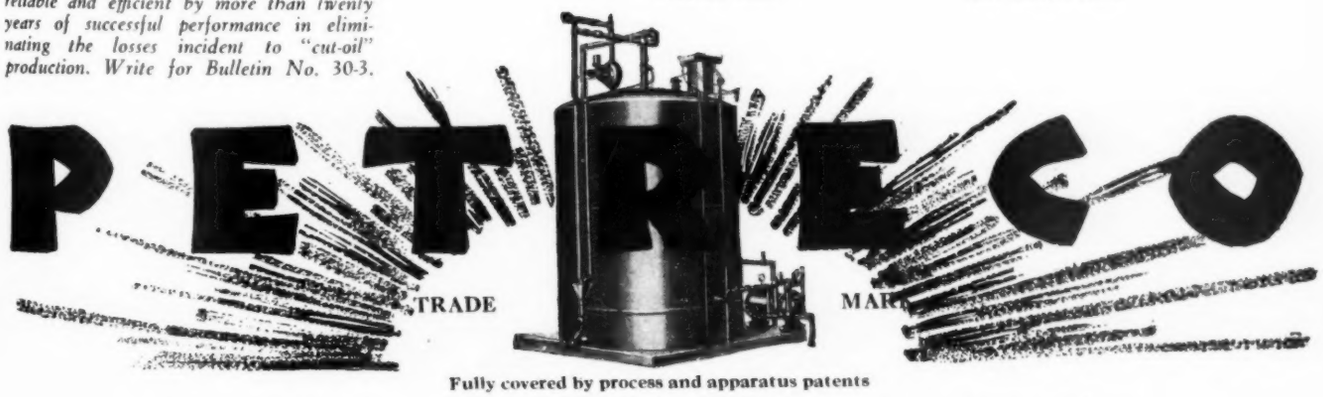
It offers a typical example of the problems that are being successfully solved every day in the Petreco laboratory—where the very latest and best scientific equipment enables Petreco engineers and technicians to predetermine the correct application of the Petreco Process to each individual case.

If you have a particularly stubborn emulsified production, let us tell you, without cost or obligation, what results can be obtained with "Petreco"—proved reliable and efficient by more than twenty years of successful performance in eliminating the losses incident to "cut-oil" production. Write for Bulletin No. 30-3.

PETROLEUM RECTIFYING CO.
OF CALIFORNIA
530 W. SIXTH ST. LOS ANGELES, CALIF.

412 PETROLEUM BLDG.
HOUSTON, TEXAS

2015 FT. WORTH NAT'L. BANK BLDG.
FORT WORTH, TEXAS



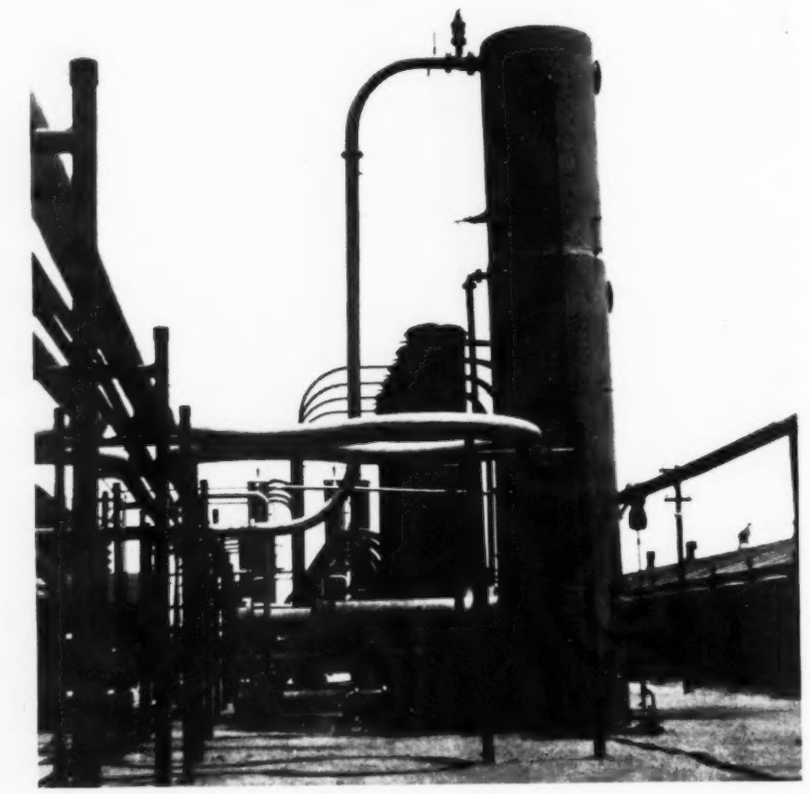
Fully covered by process and apparatus patents

When writing PETROLEUM RECTIFYING CO. *please mention The Petroleum Engineer*

tion, the effect of the presence of air and water dissolved in the oil.

As illustrated by Figure 1 accompanying, the apparatus consists of two hollow brass cylinders, interconnected at top and bottom and equipped with two stopcocks on the top of each cylinder. By the correct use of these two cylinders it is possible to so admit a mixture of oil, air and water that the pressure registered on the manometer at the completion of the test represents the vapor pressure of the oil in millimeters of mercury absolute.

If an absorption oil is placed in an enclosed vessel with an evacuated space above the surface of the oil, the oil will vaporize until the vapors in the space produce a pressure equal to the vapor pressure of the remaining oil. The resulting vapor will be composed principally of the lighter components that were in the oil and the remaining liquid will consequently be of a heavier composition than the original oil before the vaporization was allowed to take place. That is, the oil will have been partially stripped of its lighter, higher vapor pressure components. Now, if the space is filled with air, the result will be the same, as the hydrocarbons act independently of air or of one another. However, the resulting total pressure will be equal to the sum of the air pressure before vaporization, plus the vapor pressure of the remaining oil after vaporization. This latter physical phenomena is used in the apparatus under discussion. That is, the vapor pressure of the lean oil is registered on a mercury manometer which is actuated as a result of the vaporization of the oil into the space containing air at atmospheric pressure. The accuracy of this apparatus is dependent upon this volume of air maintaining a partial pressure equal to atmospheric after the oil and air are co-mingled. Due to the solubility of air in absorption oil it is necessary to saturate the oil sample with air before admitting the oil to the apparatus. This is done to prevent a decrease in the volume of air within the vapor space during the test. This operation is accomplished by admitting an excess quantity of air to the original sample bomb, at test temperature, and thoroughly shaking the mixture. In this manner the previous error occasioned by the presence of dissolved air in the oil is eliminated. Next, in order to eliminate the error caused by water in the oil sample, it is necessary to deviate slightly from the above. This means that the indicated pressure on the manometer will be equal to the vapor pressure of the oil plus the partial pressure of the water vapor. To eliminate this error a mixture of air and water is first introduced in one cylinder of this apparatus, thoroughly mixed, and allowed to reach equilibrium at the test temperature. The total pressure in that cylinder is then equal to atmospheric and is due to the summation of the partial pressure of the water vapor plus the partial pressure of the air present. This results in an equilibrium in which a pressure equal to atmospheric is still exerted by the air and water present. The presence of excess water eradicates the possibility of the oil removing water from the vapor space, and thus the indicated pressure can be reasonably termed accurate in so far as these factors are concerned. However, as previously mentioned, any vaporization results in a lowering of the vapor pressure of the remaining material. For an absorption oil having a vapor pressure not exceeding 10 mm. this error will be negligible. However, for a lean oil so incompletely stripped that even ethane remains, the error becomes quite appreciable. By calculation it may be illustrated that, for the extent of vaporization necessitated by the procedure of this test, a lean oil having a vapor pressure of 25.0 mm. may have an indicated reading 20 per cent lower than the true value. The greater portion of this error is caused by the preliminary saturation of the oil in the sample bomb with air. However, for any particular plant the error will be consistent and consequently even for high vapor pressure tests the apparatus is valuable for individual plant control, inasmuch as very accurate readings are not necessary for any oil having a vapor pressure in excess of 10 mm. For the heavier constituents the lowering of the respective partial vapor pressures in the remaining oil due to vaporization has been calculated to amount to the following:



Absorbers in a natural gasoline plant.

Iso-Butane	5.3%
Normal Butane	3.7%
Iso-Pentane	1.4%
Normal Pentane	1.06%
Normal Hexane	0.32%

The only other error inherent to this apparatus is in the use of a manometer. That is, when the stopcock is opened to the mercury a flow of vapors results until the head of mercury balances the vapor pressure of the oil. By using a manometer having an internal bore of $\frac{1}{8}$ inch this loss is reduced to a negligible quantity. Consequently, it may be safely stated that an indication of 10.0 mm. will be within 0.4 mm. of the absolute vapor pressure of the original sample.

THE WORLD'S GREATEST UNIONS

PANAMA CANAL

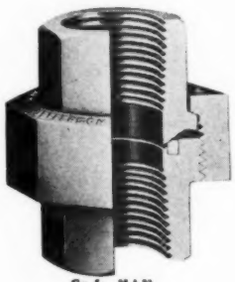
This gigantic engineering feat was first attempted by the French in 1880 and abandoned in 1888. Recommenced by the United States in 1904, it was completed in 1914, uniting the Atlantic and Pacific in a waterway that saves thousands of miles of travel for boats bound from one ocean to the other. Plentiful American skill and courage, even into the avenues of medicine, fighting Yellow Fever, was dedicated to the consummation of this great union of oceans.

A similar triumph—in manufacture—is responsible for Jefferson Unions, the unions that are stronger, tighter and more durable. Air-Refined, Certified Malleable Iron, made in our own foundry and tested for a uniform tensile strength of 50,000 pounds, is used exclusively in Jefferson Unions. The best brass obtainable goes into the seat rings, located in a recess away from the runway of the fitting and protected from abrasive and corrosive wear. Ground ball, brass to iron joints, ground in pairs and never separated, give sealed tightness without the need of gaskets. Play between nut and swivel end and large, coarse threads allow easy fit, even when pipe stems are out of alignment. Threads graphite-coated, giving high salvage value. Furnished with iron to iron joints, as well as brass to iron, at no extra cost, when specified for use in oil fields where a highly corrosive condition exists.

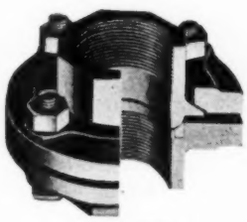
Handled By All Leading Oil Industry Jobbers

Jefferson Union Company

LEXINGTON, MASS., U. S. A.
Sales Offices: 11 W. 42nd St., New York, N. Y.



Style "A"
W. P. 300 lbs.



Style "B"
W. P. 200 lbs.

Style "D"
W. P. 500 lbs.

Style "E"
W. P. 1000 lbs.

JEFFERSON

When writing JEFFERSON UNION CO. *please mention The Petroleum Engineer*

Improved Methods of

Handling Mud Fluid *in* Hobbs Field, New Mexico

By HAROLD VANCE,
Manager, Balance Oil Co.

IMPROVED methods of handling drilling fluids over those generally used in other Permian Basin fields in West Texas are being practiced in the Hobbs field in Southeastern New Mexico.

The excessive cost of mud at the location and the cutting action of the gas has brought into use devices never employed before in this area.

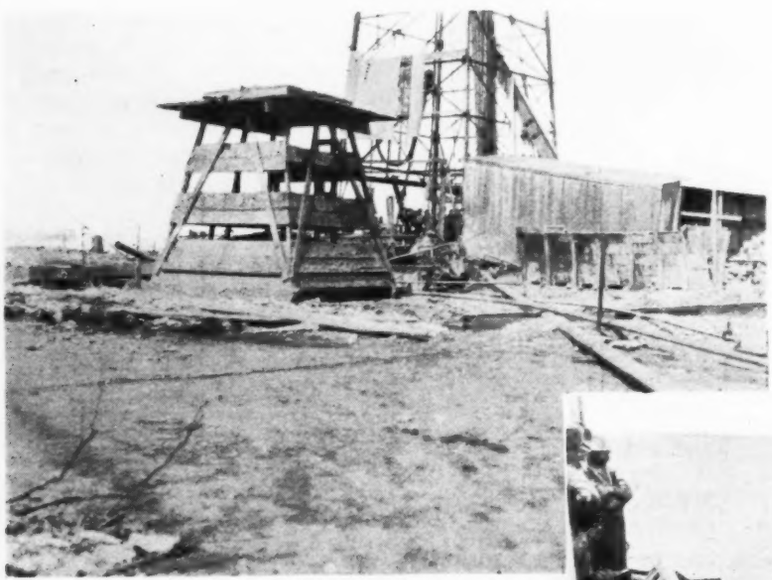
Development in Winkler County, Texas, which was similar to the Hobbs field, was characterized by the lack of care of the mud fluid. Circulating ditches were scooped out of the sand and when the circulation pit became full of cuttings it was emptied, resulting in considerable loss of mud.

In the Hobbs field about 50 per cent of the operators are using wooden circulating ditches with some improved method of removing the cuttings. A shale horizon encountered in drilling produces a large amount of cuttings due to caving and washing out.

The California company is using an aerating and settling tower which is proving very useful for removing cuttings and gas from the mud, as well as for cooling the mud after being cooked and mixed with steam.

The Amerada Petroleum Corporation is using two different types of mechanical separators for removing cuttings. One type is placed directly on the mud ditch and the other uses mud fluid pumped directly from the service pit.

The problem of securing the proper type of mud fluid is worthy of much thought while



Top—Mechanical separator used in conjunction with settling ditches for removing drill cuttings—Amerada Petroleum Corporation, Hobbs Field, Lea County, New Mexico.

Above—Mud mixing pit together with settling and aerating tower at California Company No. 1 State, Sec. 29, T-18S, R-38E, Hobbs Field, Lea County, New Mexico.

At right—Mechanical separator for removing cuttings from the drilling fluid, used by Amerada Petroleum Corporation, Hobbs Field, Lea County, New Mexico.

drilling under conditions such as exist at Hobbs. Steam mixing and cooking of ordinary clay muds tend to increase the amount of colloidal material, thus decreasing the speed of settling. In Figure 1, curves graphically depict the difference in settling time of the same mud mixed mechanically and by steam.

With an increase in specific gravity of the mud fluid there is an attendant increase in the surface tension. Under ordinary circulating methods, by increasing the specific gravity of the mud fluid to overcome gas pressure a large amount of gas is carried back into the hole, thus decreasing the weight of the column of fluid. The curve in Figure 2 illustrates the increase in surface tension, due to increasing the specific gravity by addition of clay alone. The addition of small quantities of lime decreases the surface tension below that of the same gravity of mud. Other chemicals have somewhat the same effect.

It has been found in practice that sometimes the chemical used to increase the weight of the mud fluid above that possible with clay alone has a detrimental effect on some porous producing lime horizons. The pressures encountered at Hobbs make it possible, with proper care of the mud fluid, to have complete protection while drilling without using any chemical for giving increased weight.

Tower for removing cuttings and gas from the drilling fluid, in use at California Company No. 1 State, Hobbs Field, Lea County, New Mexico.

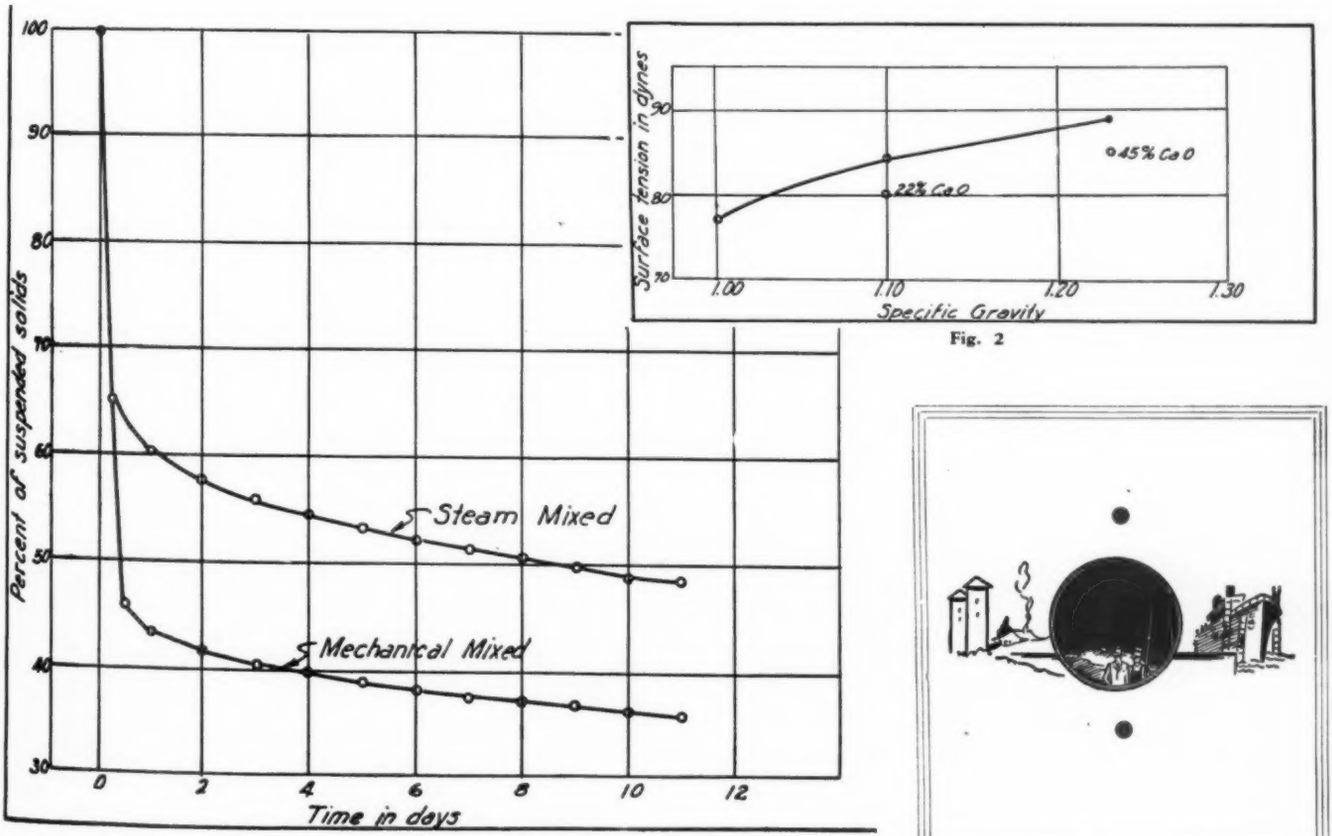
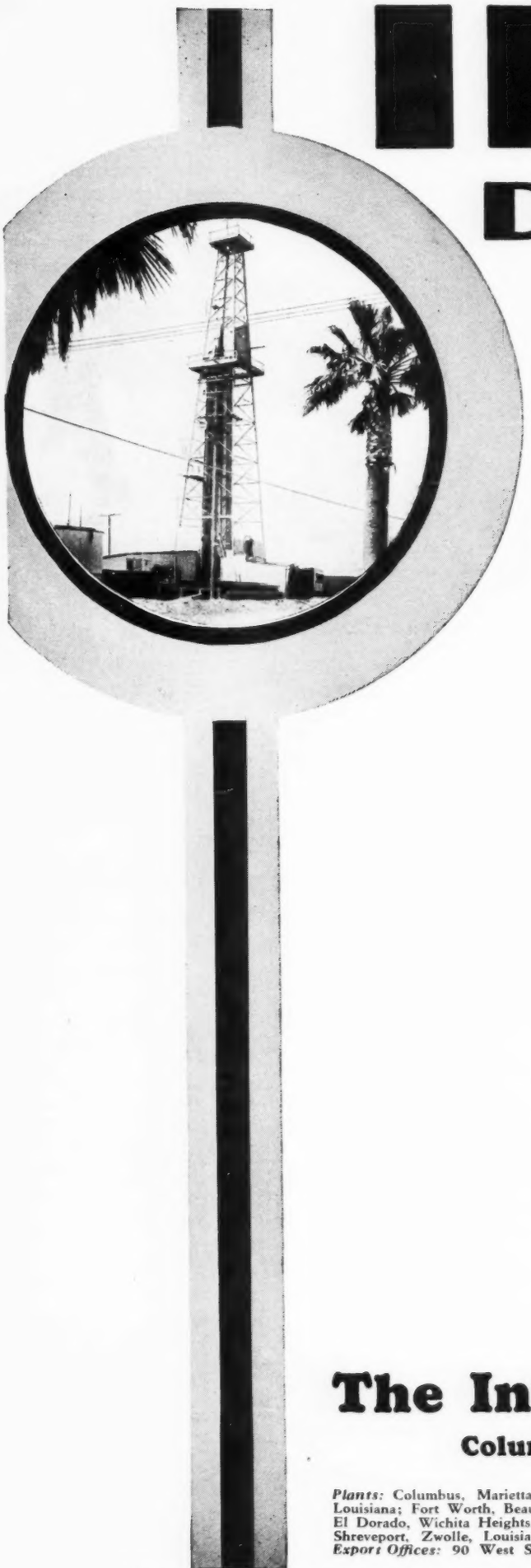


Fig. 1

Fig. 2

IDECO DERRICKS



THE same principles of structural design and manufacture as taught in every engineers' school and practiced by ever structural engineer, are used in building "Ideco" equipment.

The superior strength of "Ideco" Derricks is attained with from 30 to 60% fewer parts than any derrick on the market. They represent a permanent investment that pays big dividends in speeding up production and minimizing upkeep costs.

Galvanized for protection against the elements—engineered for the most severe service conditions throughout the oil fields of the world.

The International Derrick

Columbus, Ohio — Marietta, Ohio —

Plants: Columbus, Marietta, Delaware, Ohio; Torrance, California; Beaumont, Houston, Texas. ***District*** Louisiana; Fort Worth, Beaumont, Texas; Maracaibo, Venezuela. ***Warehouses and Stocks:*** Columbus, Dela- El Dorado, Wichita Heights, Kansas; Houston, Beaumont, Big Spring, Odessa, Pyote, Pampa, Borger, Mexia, Shreveport, Zwolle, Louisiana; Smackover, El Dorado, Arkansas; Bakersfield, Taft, Torrance, California; ***Export Offices:*** 90 West Street, New York City; Columbus, Ohio; Houston, Texas; Los Angeles, Calif.

When writing INTERNATIONAL DERRICK & EQUIPMENT CO. *please mention The Petroleum Engineer*

IDECO BOYKIN ROTARIES

THE economy of "Ideco" rotary drilling equipment is not measured by the first cost even though that first cost *is* reasonable. It is rather found in satisfactory operation through years of gruelling oil field service without loss of production or the necessity of costly replacements and repairs.

Whether your interest be in the Ideco Boykin Rotaries, the Regular or Big Texan Draw Works, the Streamline Traveling or the Straight line Crown Blocks, you will find in this line of drilling equipment practical, field-studied machinery.

Service and warehousing in every prominent oil field.

INTERNATIONAL DERRICK & EQUIPMENT COMPANY — BOYKIN — IDECO — SEIDECKER

& Equipment Company

Beaumont, Texas — Los Angeles, California

Offices: New York City, N. Y.; Pittsburgh, Pennsylvania; Wichita, Kansas; Tulsa, Oklahoma; Shreveport, ware, Ohio; Seminole, Tonkawa, Drumright, Okemah, Maud, Sasakwa, Allen, Oklahoma City Oklahoma; Luling, Wichita Falls, Grand Saline, Seguin, Hebbronville, Pettus, Refugio, Beeville, Texas; Lake Charles, Hobbs, New Mexico.

717

When writing INTERNATIONAL DERRICK & EQUIPMENT CO. *please mention The Petroleum Engineer*

Wells Produced *by* Intermittent Gas-Lift Yield Encouraging Results

By K. C. SCLATER

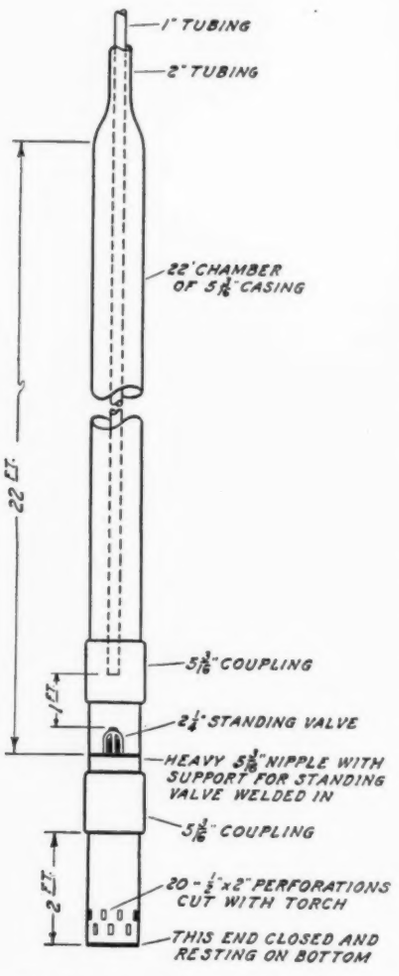
FLOWING wells of small daily production from depths of more than 4,000 feet by the intermittent artificial gas-lift method has passed from the experimental stage to that of practical routine operation. In the Seminole field, Oklahoma, the Carter Oil Company has taken eleven wells between 4,000 and 4,500 feet in depth and ranging in daily production from 35 to 268 barrels and is producing them by intermittent artificial gas-lift flow. Of the eleven wells, two had been pumping about 35 barrels a day and the remainder produced by the continuous artificial gas-lift method. One well in the Cromwell field, completed in May, 1925, at a depth of 3,390 feet and an initial production of about 770 barrels daily, was recently put on intermittent artificial gas-lift flow after the daily production had declined to about 18 barrels on the pump.

Lawrie Bowman, district foreman, Carter Oil Company, Seminole.

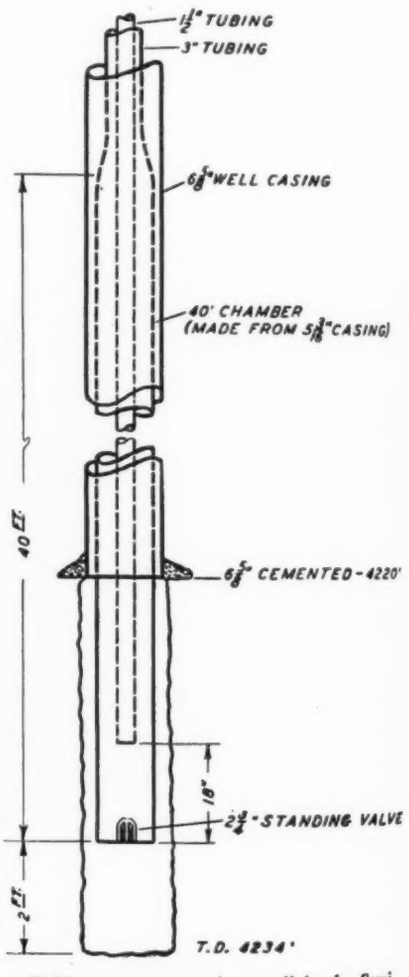
Those wells taken off the continuous gas-lift method and put on intermittent gas-lift flow had declined in daily production to the point that they were taking excessive quantities of input gas per barrel of oil. When the production declined to about 200 barrels a day the gas-input volume would increase to about 7,700 cubic feet per barrel and the formation gas-oil ratio about 800 cubic feet, or a total gas-oil ratio of 8,500 cubic feet per barrel. With a further decline in production to 100 barrels a day the total gas-oil ratio would mount to as high as 16,000 cubic feet per barrel. As most of the wells were supplied with gas from gas-lift compressor plants on the lease, the compression cost increased as the total volume of gas handled diminished. So in May, 1929, four wells on one lease were put on intermittent gas-lift flow. Besides a reduction in the input gas-oil ratio, three of the wells showed an increase in daily oil production. No change in daily oil production was observed on the fourth well. Since March of this year the other wells have been put on intermittent gas-lift flow and in every instance an increase in oil production and a reduction in formation and input gas-oil ratios have been obtained. (See table.)

For regulating the flow, two types of intermitters are in use, the J. A. T. and the National. Since putting the first wells on intermittent flow many field tests have been made and much valuable information obtained regarding the flow characteristics of the wells. This has resulted in making a number of changes in flow-tubing sizes, input-gas pressures, and time intervals. As a matter of fact, tests to observe the effect of these different factors are made continually and have become an important part of routine field work.

In most of the wells first put on intermittent flow, 2½-inch tubing is carried to within a few feet of bottom, inside 6⅝-inch casing. The gas is injected down inside the tubing and flowed through the annular space between the tubing and casing. One of the first four wells, which had been pumping 35 barrels a day on the beam, is equipped with 3-inch tubing to the bottom of which a joint of 5⅞-inch casing was added as a flow chamber. The bottom of the chamber is closed off and is equipped with a 2¼-inch standing valve. In-

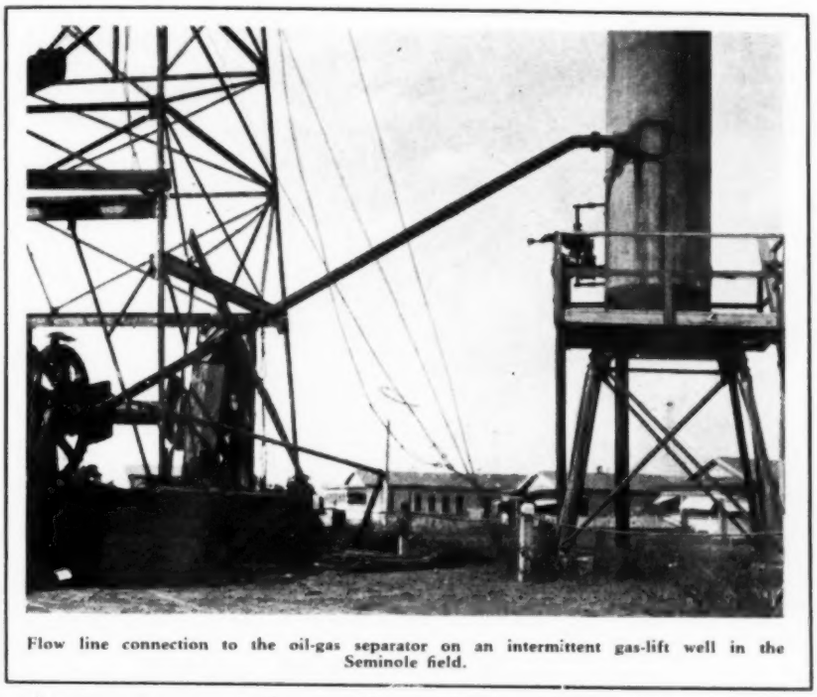

1" TUBING
2" TUBING
22' CHAMBER OF 5⅛" CASING
22 FT.
5⅛" COUPLING
1 FT.
2¼" STANDING VALVE
HEAVY 5⅛" NIPPLE WITH SUPPORT FOR STANDING VALVE WELDED IN
5⅛" COUPLING
2 FT.
20 - ⅛" x 2" PERFORATIONS CUT WITH TORCH
THIS END CLOSED AND RESTING ON BOTTOM

Tubing arrangements in a well in the Cromwell field, flowed through a one-inch pipe from about 3,390 feet depth by the intermittent gas-lift method.



Tubing arrangements in a well in the Seminole field, flowed through 1½-inch pipe from about 4,230 feet depth by the intermittent gas-lift method.

side the 3-inch, a string of 1½-inch tubing is suspended with the bottom about 18 inches above the standing valve in the bottom of the 5⅞-inch chamber. The intermitter was installed between the compressor plant on the lease and the well. Gas is admitted at regular predetermined intervals into the annular space between the 1½-inch tubing and the 3-inch tubing and the production, which has accumulated in the 5⅞-inch chamber, flowed out through the 1½-inch tubing. The interval during which the well is allowed to flow is partly controlled by releasing the gas pressure in the annular space into the gas gathering line thus giving the oil in the well a chance to enter the chamber through the standing valve. It should be noted that the annular space between the 6⅝-inch casing and the 3-inch tubing is connected to the gas-gathering line which carries no pressure or, if any, only a pound or two above atmosphere. As the well pressure builds up outside the chamber it establishes a differential pressure sufficient to start flow through the standing valve into the 5⅞-inch chamber. When a change is made on a well these time intervals are closely observed. A complete cycle for the well under consideration would be as follows:



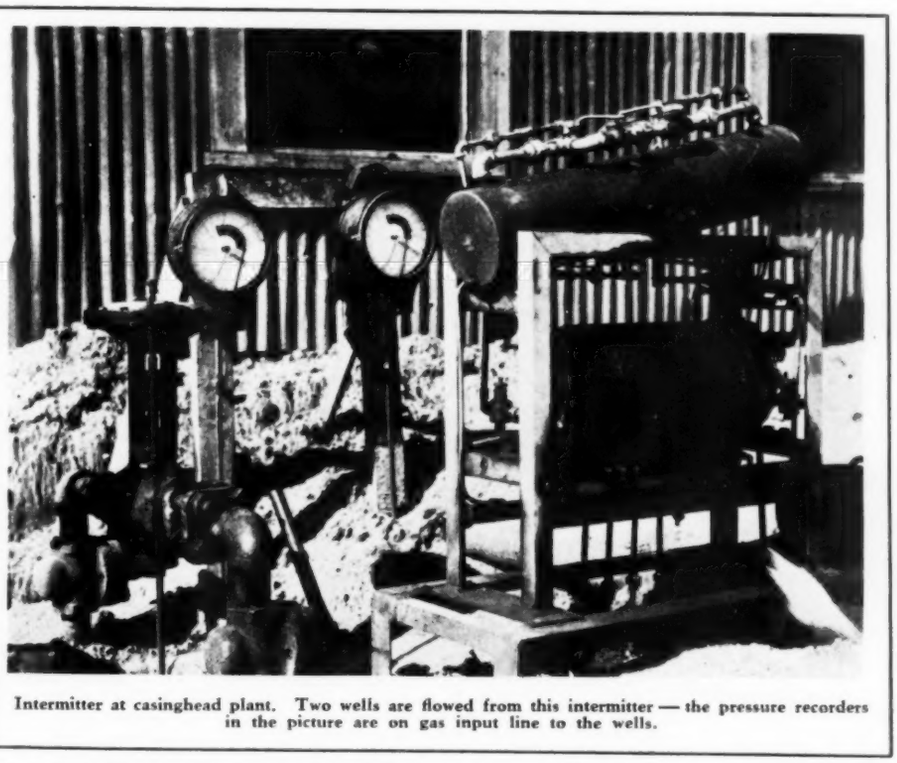
Flow line connection to the oil-gas separator on an intermittent gas-lift well in the Seminole field.

1. Admit high-pressure gas to 3-inch tubing.
2. Close off high-pressure gas to 3-inch tubing.
3. Open pressure release from 3-inch tubing to gas-gathering line.
4. Close pressure release from 3-inch tubing to gas-gathering line.
5. Admit high-pressure gas to 3-inch tubing.

A typical time interval and well observation test in the field is here given:

Time Intervals

(figures refer to steps in foregoing cycle)—1 to 2, 10 minutes, 0 seconds; 2 to 3, 8 minutes, 0 seconds; 3 to 4, 4 minutes, 0 seconds; 4 to 5, 6 minutes, 0 seconds; 1 to 5, 28 minutes, 0 seconds. Maximum input gas pressure, 270 pounds.



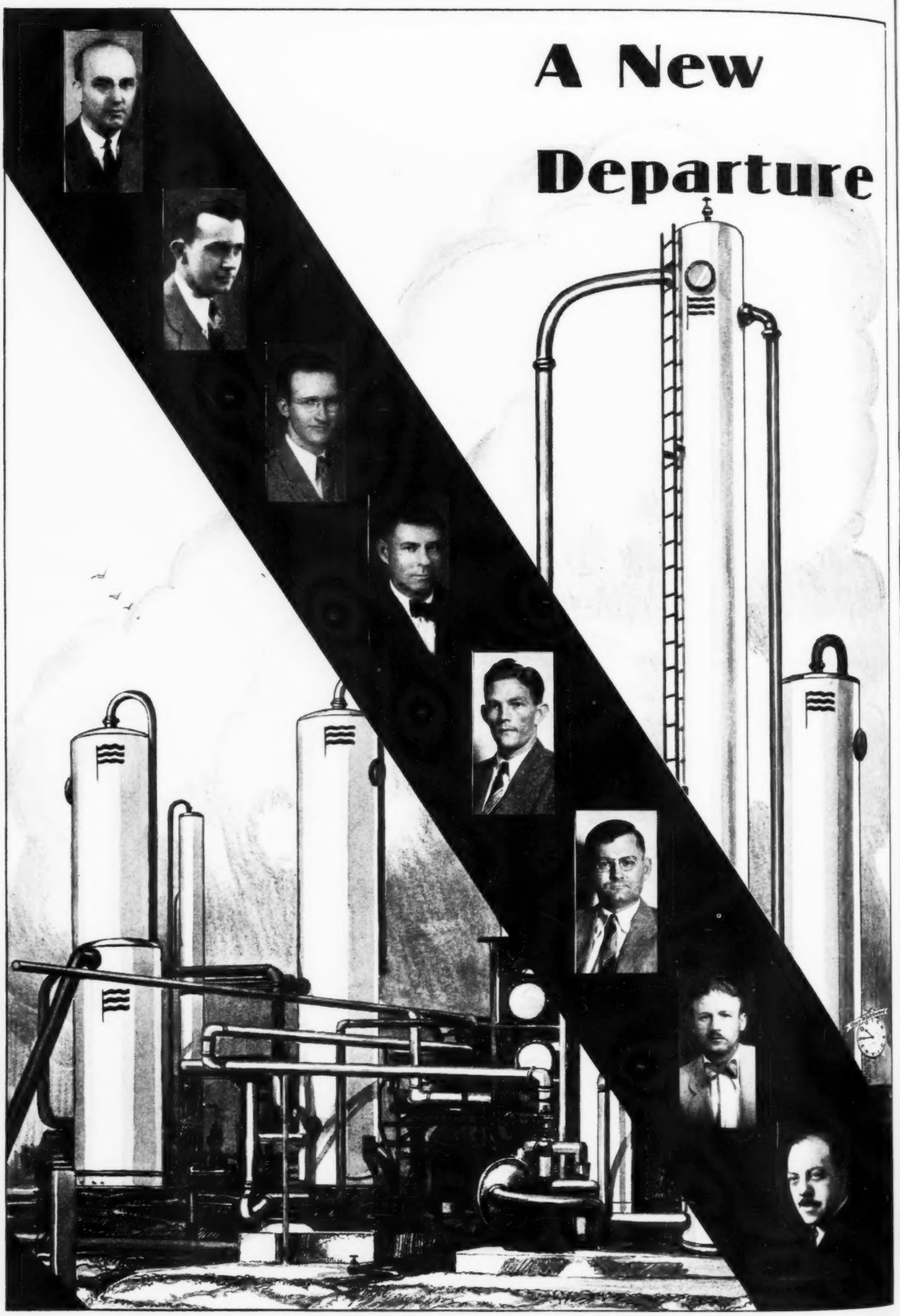
Intermitter at casinghead plant. Two wells are flowed from this intermitter — the pressure recorders in the picture are on gas input line to the wells.

This information is taken and correlated with the well's production and behavior. In this manner improvements are constantly being made.

Accurate gas measurements on input gas to intermittent wells are hard to obtain because the violent and wide range of flow renders it almost impracticable to take a continuous accurate record of gas consumption on a well. When a change of any kind is made in the operation of the well a check on the gas-input volume is obtained by taking an hour's measurement on the gas with a recording meter equipped with a fast clock. This method is also employed for making periodic measurements of the gas volume.

Pressure recording meters are installed on the gas-input line. The 24-hour charts, illustrations of which accompany this article, furnish a satisfactory continuous record of what is taking place at the well, as they show the time interval and maximum input pressures, also the minimum pressure on input line after the gas-input is shut off. Recent changes have been made in the handling of the gas from gas-lift plant. All gas is now compressed at the casinghead gasoline plants. This arrangement has resulted in a lower compression cost per thousand cubic feet of gas.

Maximum input pressures at the well range from 250 to 350 pounds. Interesting tests are now being conducted whereby it is hoped to be able to flow the average well intermittently by artificial gas-lift at a maximum pressure somewhere between 250 and 300 pounds. One well in particular has been tested with a number of different combinations of piping arrangements in the well. This well is equipped with two 50-gallon test tanks on the derrick floor for gauging the oil production during each cycle of intermittent flow. This well is one that was pumping 35 barrels a day


A New
Departure

A New Department

The Refinery and Gasoline Plant Division of Black, Sivalls & Bryson, Inc.

Just as Black, Sivalls & Bryson, Inc.—known to the trade as "*B. S. & B.*"—has been a byword for tanks, now will "B. S. & B." also signify satisfaction in Refinery and Gasoline Plant Equipment.

Black, Sivalls & Bryson have inaugurated this new Division, located at Tulsa. It has been functioning for several months, prior to this our first announcement, and considerable work is under way. A staff of engineers, who have specialized in the design and manufacture of Refinery and Gasoline Plant Equipment, has been employed, which manpower is reinforced with the services of the Engineers of Black, Sivalls & Bryson, as well as those of the American Tank & Equipment Corporation of Oklahoma City, a B. S. & B. subsidiary.

Regular or special equipment for your individual needs will be designed by these Engineers, and manufactured purposely for you—then installed under their supervision.

Note the personnel of this new Division—trained, efficient Engineers, with an ample background of technical education and actual experience.

The Office of this REFINERY AND GASOLINE PLANT DIVISION is at 430 South Rockford, Tulsa, Oklahoma.

A Complete Service

Design
Manufacture
Construction

The Refinery and Gasoline Plant Division will work closely with the B. S. & B. Manufacturing Subsidiary, the American Tank & Equipment Corporation of Oklahoma City. The equipment designed by this Division is produced under their general supervision in the Oklahoma City Plant, which is the largest shop of its kind west of Chicago, and one of the most modern and complete plants in the country, which specializes in welded tanks, heavy pressure vessels, and other refinery and gasoline plant equipment.

Thus a complete service for the refinery or gasoline plant industry with every step carefully checked from design to the finished plant in actual operation.

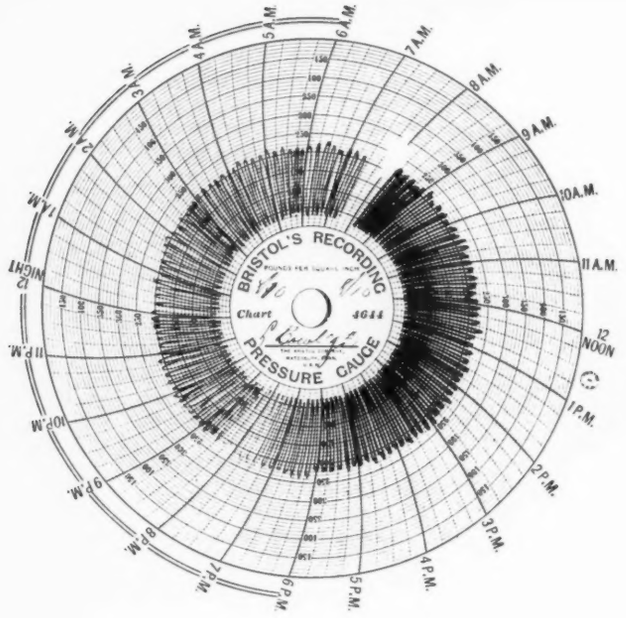
Let us figure on your Refinery and Gasoline Plant equipment, designing special plants for specific purposes. Inquiries invited.

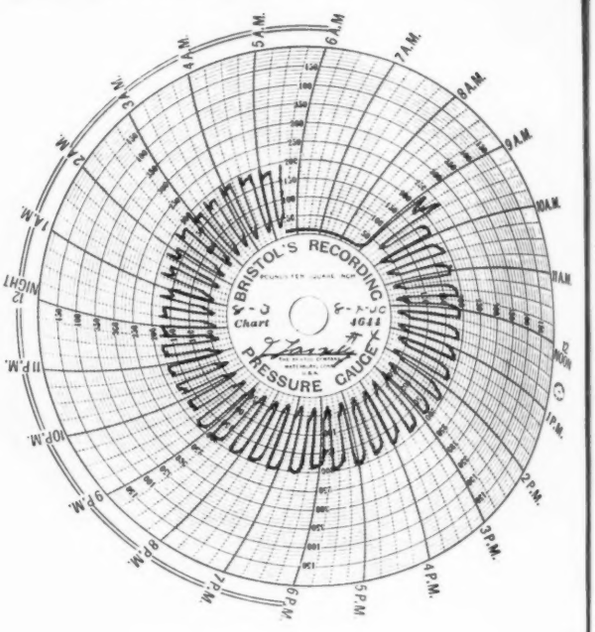
SEE OUR EXHIBIT AT THE INTERNATIONAL PETROLEUM EXPOSITION TULSA, OKLA.

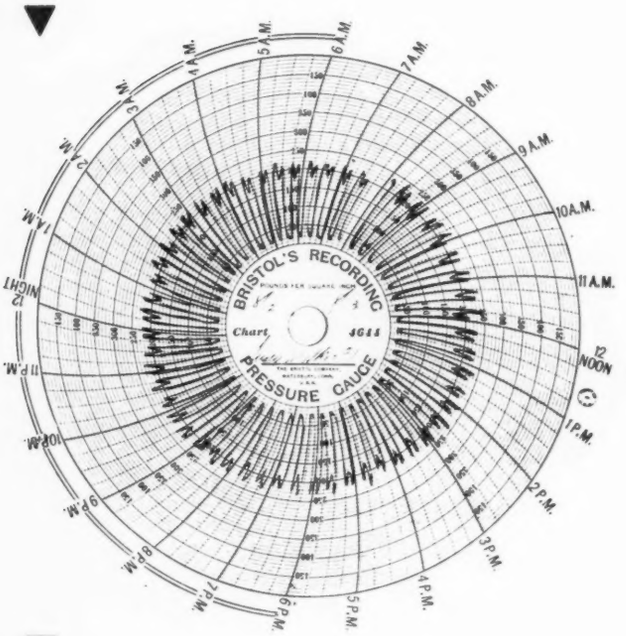
From Plan to Plant!

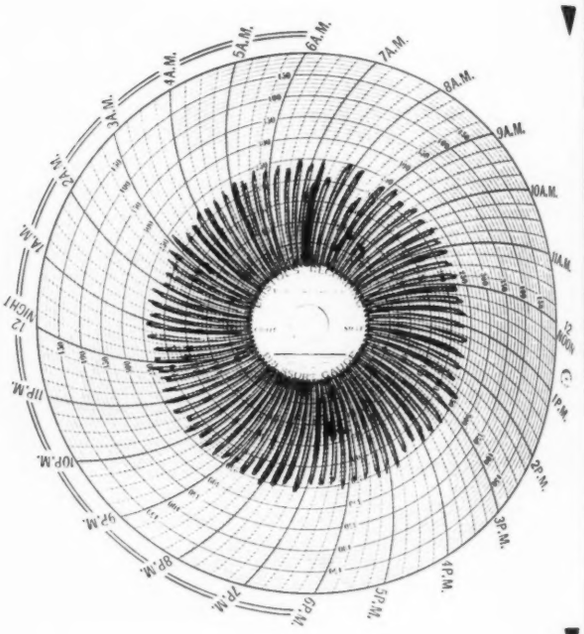
Black Sivalls & Bryson INC.
BARTLESVILLE ~ OKLAHOMA

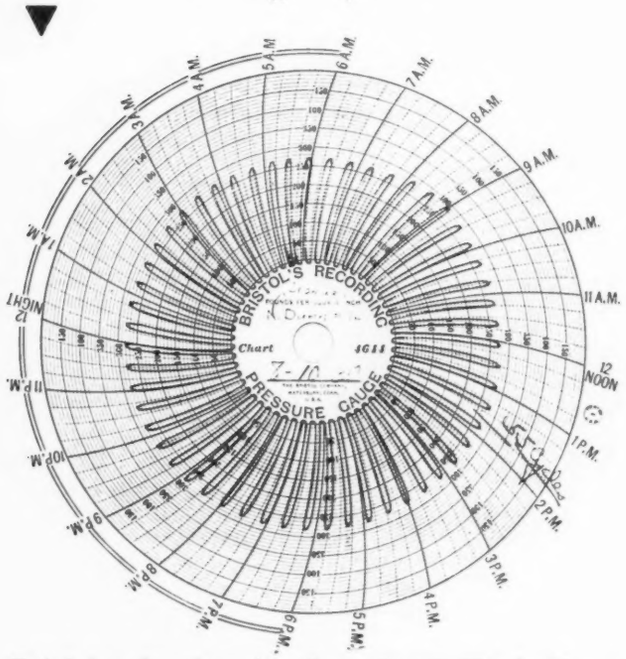
Refinery and Gasoline Plant Division
430 South Rockford · Tulsa, Oklahoma

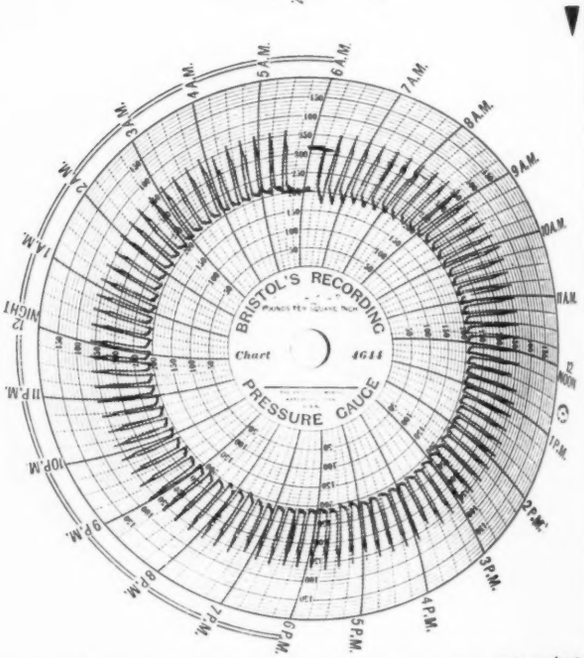




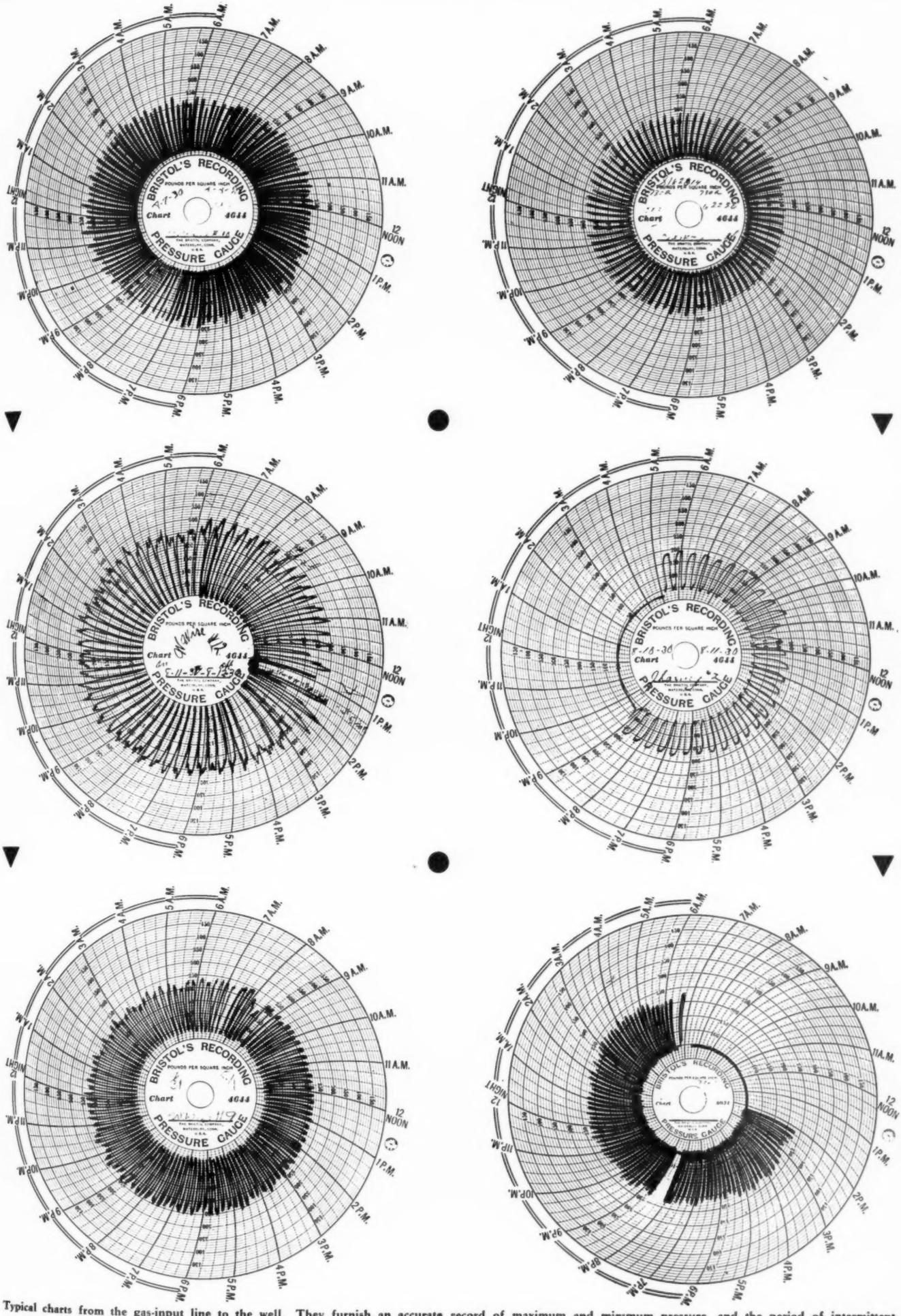






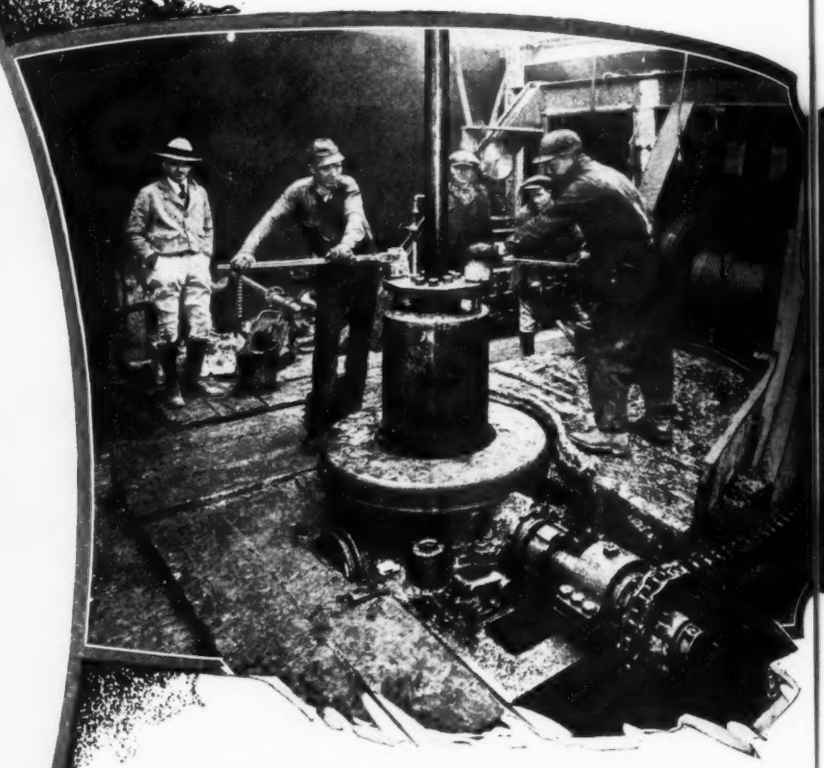


Typical charts from the gas-input line to the well. They furnish an accurate record of maximum and minimum pressure, and the period of intermittent gas flow to the well.



Typical charts from the gas-input line to the well. They furnish an accurate record of maximum and minimum pressure, and the period of intermittent gas flow to the well.

Could you drill out a bridge against 2000-lb. using your



Mills City, Well No. 1, Turner Valley, Calgary, Canada. Drilling against rock pressure of 1,500 pounds with oil circulation.

THIS was done with Sheldon Equipment on Royalite No. 11, near Calgary.

The following Sheldon Equipment was used and made possible the safe completion of that job:

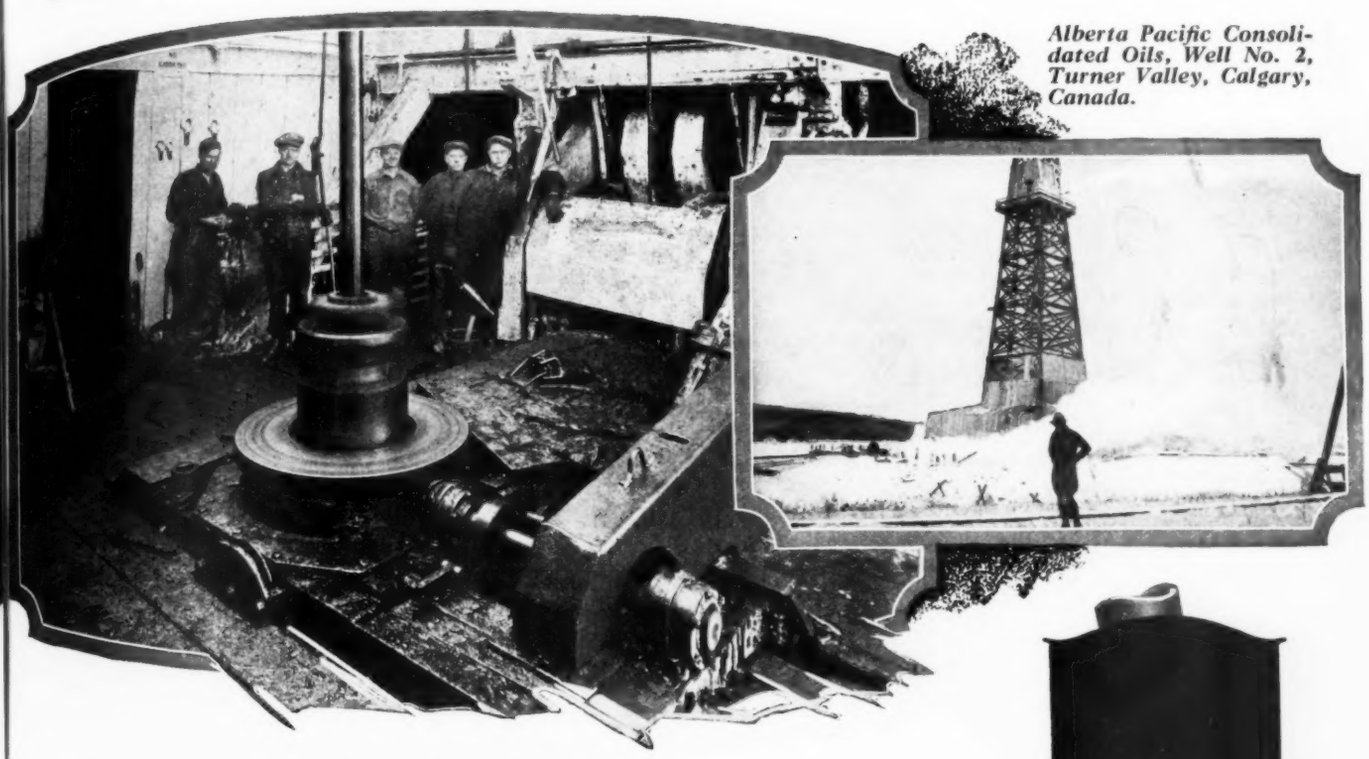
Sheldon - Burden Type HR Hydraulic - Feed Rotary Table.
Sheldon - Burden Stuffing Box.
Drill Pipe equipped with Sheldon - Burden Type Flush - Joint Tool Joints.
Sheldon - Burden Back - Pressure Valve.
Sheldon - Burden Snubbing Equipment.

After drilling out the bridge, the drill pipe was safely snubbed out of the hole and the well put in production. It gauged 50,000,000 cu. ft. of gas and 1500 barrels of oil.

SHELDON MACHINERY CORPORATION SMC NEW YORK

SHELDON HYDRAULIC FEED

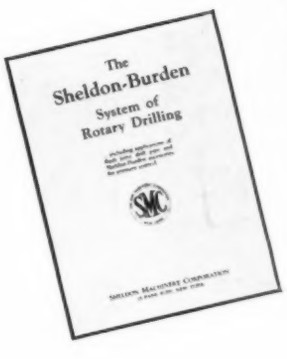
30 feet below the master valve gas pressure below the bridge present equipment?



Alberta Pacific Consolidated Oils, Well No. 2, Turner Valley, Calgary, Canada.

If Sheldon Equipment makes it possible for an operator to safely complete a job like Royalite No. 11, it is certainly the correct equipment to use when drilling wells in areas where there is any danger from blow outs.

There is no excuse for wild wells due to blow outs if modern methods and Sheldon Equipment are used.

Write us for catalog describing Sheldon Equipment and System of Drilling

SHELDON MACHINERY CORPORATION

15 Park Row, New York

Branch Office: 718 Second National Bank Building, Houston, Texas
Distributors: Oil Well Supply Company, Lucey Products Corporation

N-BURDEN ROTARY TABLES

before it was put on intermittent gas-lift flow in April of this year. At the time of writing—about five months later—this well on test produced at the rate of 78 barrels daily. It is equipped with a string of 3-inch tubing with 40 feet of 5⅝-inch casing on bottom as a flow chamber. There is a string of 1½-inch tubing suspended inside the 3-inch (see sketch). This well on each cycle flowed a smooth, steady stream of oil with an absence of the violent agitation that so often accompanies flow in wells produced by gas-lift. The cycle was as follows:

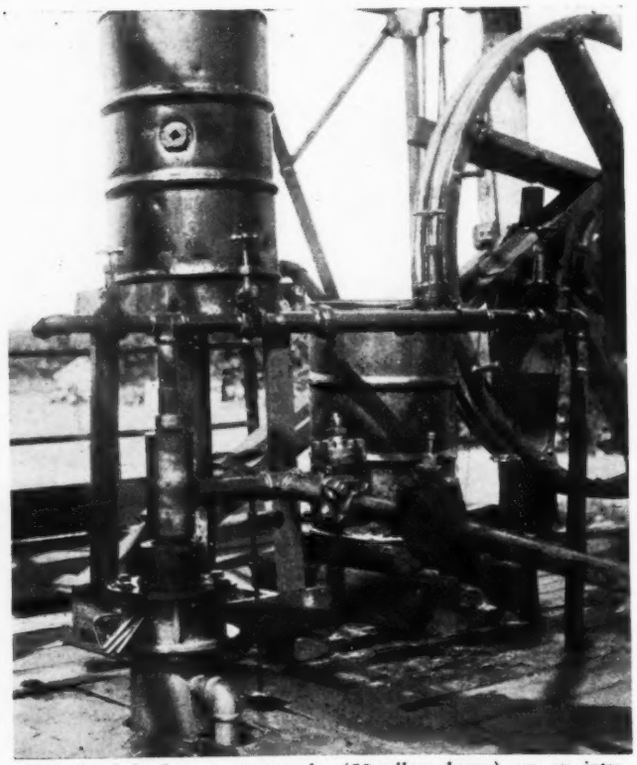
1. Admit high-pressure gas to 3-inch tubing.
2. Close off high-pressure gas to 3-inch tubing.
3. Open pressure release from 3-inch tubing to gas gathering line.
4. Close pressure release from 3-inch tubing to gas-gathering line.
5. Admit high-pressure gas to 3-inch tubing.

Referring to the foregoing numbers, the time intervals and maximum pressure were:

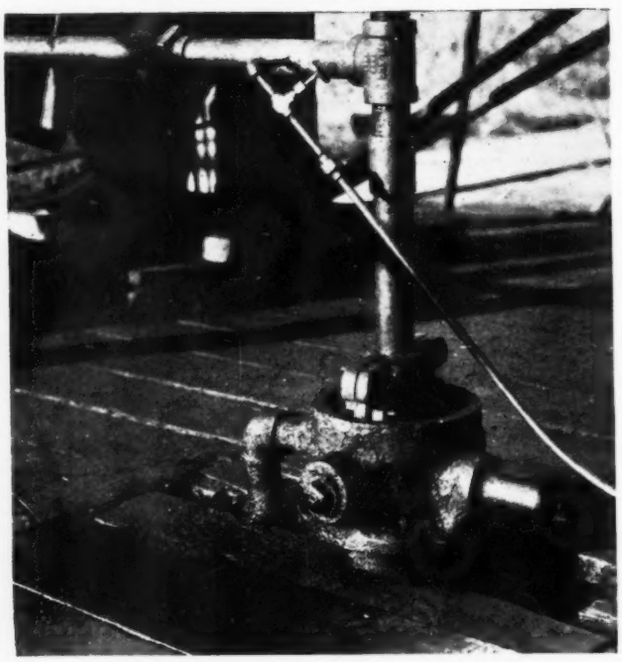
1 to 2, 7 minutes, 30 seconds; 2 to 3, 7 minutes, 4 seconds; 3 to 4, 2 minutes, 26 seconds; 4 to 5, 3 minutes, 10 seconds; 1 to 5, 20 minutes, 10 seconds. Maximum input pressure, 260 pounds.

The intermitter in this case is right at the well and the input gas-oil ratio was estimated at from 2,000 to 2,500 cubic feet per barrel.

Another interesting installation is that in a well in the Cromwell field where the inside flow string is 1-inch pipe. The piping arrangement in the well is indicated on an accompanying sketch. This well was pumping about 18 barrels of oil a day and, since put on intermittent flow about three months ago, has produced from 20 to 22 barrels a day. The maximum input gas pressure is about 270 pounds. Gas is admitted to the well for 7 minutes; 2½ minutes later the pressure release opens and stays open for 16½ minutes. The intermitter is placed at the casinghead gasoline plant, from where the compressed gas supply is furnished for flowing the well. A vacuum of a few inches is carried on the gas gathering system. On test this well shows an input gas-oil ratio of about 4,200 cubic feet per barrel.



Casinghead hook-up to test tanks (50-gallon drums) on an intermittent gas-lift well in the Seminole field.



Casinghead of intermittent gas-lift well in the Cromwell field. Note the 1-inch flow line from top of 2-inch tubing.

Two Seminole wells on separate leases are operated by one intermitter set equidistant between the two wells. Gas is supplied through a 5⅝-inch line 1¼ miles long between the gasoline plant and the intermitter. From the intermitter to each well the gas passes through a 4-inch line about 800 feet long. No standard method of locating the intermitters has been followed. An effort has been made to utilize the system of existing gas-gathering lines in the field and lay new lines only where absolutely necessary.

In the accompanying table available data on the twelve wells on intermittent gas flow are given. It is estimated that the average input gas-oil ratio now averages from 5,000 to 5,500 cubic feet, and it is hoped to reduce this volume still more.

Data on Eleven Wells Produced by Intermittent Gas-Lift

Well Depth, Feet	Date Completed	Initial Production, Barrels	Intermittent Flow Started	Well Casing	Tubing Outer	Tubing Inner	Barrels Per Day Before	Barrels Per Day After	Input Gas Per Barrel Before, Cubic Feet	Input Gas Per Barrel After, Cubic Feet
4,151	3/ 7/27	5,685 Nat. Flow	4/19/30	6⅝"	----	2½"	268	325	.....	.....
4,130	9/21/27	80 Swab.	5/25/29	6⅝"	----	2½"	158	175	7,900	5,500
4,125	10/21/27	695 Swab.	5/25/29	6⅝"	----	2½"	162	185	6,900	5,500
4,344	10/23/27	370 Swab.	5/25/29	6⅝"	3"	1½"	*35	45	*	5,500
4,250	1/26/28	25 Swab.	5/25/29	6⅝"	----	4"	90	90	11,500	5,500
4,349	9/ 5/28	405 Swab.	3/16/30	6⅝"	----	2½"	225	225	6,000	4,500
4,308	12/19/28	380 Swab.	3/10/30	6⅝"	----	2½"	125	125	8,500	7,800
4,061	3/ 8/27	1,460 Nat. Flow	4/19/30	6⅝"	----	2½"	68	70	11,600	.....
4,295	10/ 1/27	360 Swab.	4/18/30	6⅝"	----	2½"	155	270	9,000	.....
4,168	7/30/27	300 Nat. Flow	4/18/30	6⅝"	----	2½"	76	110	7,300	.....
4,245	9/ 6/27	145 Swab.	5/ 1/30	6⅝"	3"	1½"	*35	78	*	.....
3,390	5/14/25	773	6/ 5/30	6⅝"	2"	1"	*18	22	*	4,200

*On Pump.

Gas measuring station in the Richland, La., gas field.

Causes of Errors in Natural Gas Measurement

By **F. T. WICKS,** *Cities Service Gas Co.*

IN the early days of the natural gas industry the gas was first sold on a flat rate basis. This method of selling gas proved to be very undesirable for many reasons. The greatest objection to selling gas on this basis was that the consumers were wasteful in regard to its use. Inefficient burning appliances would be left on, whether heat was really needed or not. Therefore, it was not long until the orifice and displacement types of meters were perfected and put into use by the natural gas companies. It was found, after meters had been installed by the pipe line companies to measure the volume of gas that was purchased from the producers at the wells and sold to the consumers at the other ends of the lines, that there was a difference between the total volumes purchased and sold.

The term discrepancy, as used in this article, denotes the volume of gas that is lost or gained in the pipe line, between the points where the gas is measured into the lines and the point where it is measured out. An important part which the discrepancy department has in the organization of a natural gas company is to help to keep down the leakage of gas from the pipe line system; to show how much gas is lost per day and to be able to tell in which part of the system the heaviest leakage is showing and the reason for the shortage in that division, thereby ascertaining whether the leakage is due to poor measurement, leaks in the pipe lines or errors in the accounting.

To better accomplish this purpose the pipe line system of our company is divided into sections. Each clerk has an average of about thirty-five of these sections on which they post the deliveries of all charts and figure the amount of loss daily. Each day the charts coming in from the field are sent from the meter department to the gas accounting department, where they are calculated. After being figured they are routed through the discrepancy department. Here they are posted as inputs on the various sections, if they are from meters measuring purchase gas or gas checked in from another section through check meters. They are carried as outputs, if they are from meters measuring gas which is being sold or checked into another section of line. After the posting of charts for the day is completed, a total of the purchase and check meter deliveries is taken. Then the total of the gas sold and checked into other sections is taken and the difference between these two totals is the amount of gas lost for the day. When adding up the total inputs and outputs, the deliveries, as posted from the charts, are corrected for both pressure base and gravity, so that all loss is on an eight-ounce base.

Errors in Measurement

In measuring gas in or out of a pipe line it is found that many errors exist in the measurement, which will cause either a shrinkage or a gain in the volume of gas within the line. Among the more common of the errors which will give a shrinkage within the line are the forming of ice on the edges of the orifice at the point where the gas is purchased from the well, and the freezing of the needle or gate valve and gauge lines leading from the meter run to the gauge. Then there is the shrinkage caused by excessive amounts of gasoline and water passing through the orifice in either vapor or liquid form, and shrinkage due to disturbance in the flow of the gas as it passes through the meter. This condition is sometimes due to the method of restricting the flow of gas ahead of the meter, the method of regulating the pressure and the construction of the meter run.

As most of the gas wells produce water and gasoline in either a vapor or liquid form, the moisture during the winter months when the temperature of the mixture of gas and fluid is below freezing will freeze on the edge of the orifice, causing the size of the orifice to change and thereby giving a high measurement to the volume of gas passing through the meter. This condition is usually prevalent in the districts where the gas is produced from wells having low rock pressures. As the rock pressure on the wells declines, the water below the gas sand works its way into the bottom of the wells in increasingly larger amounts and, unless the water is blown from the well or caught in drips ahead of the meter setting, it will be carried from the well into the lines.

There are gas companies whose lines are connected to the shale gas wells in the state of Kansas. In that district during the winter months a high measurement of the gas is often due to ice forming on the edge of the discs. The charts from the meters in that area indicate this condition very clearly. For example, let us assume that we are measuring the gas from a well where the differential reading on the chart is constant at about 15 inches and where the pressure in the line into which the gas is flowing is constant. During the winter months we received charts from the meters in this field which showed a constant differential reading of about 15 inches, and then, due to ice forming on the edge of the orifice, the differential gradually increased to read 30 or 40 inches, and then slowly declined until it again marked at its normal delivery of about 15 inches. The change in delivery due to freezing is apparent, if the charts are looked over by someone who is familiar with meters and the measuring of gas.

The needle and globe valves in the lines leading from the flange or meter run to the meter forms an ideal place for freezing. If one of the gauge lines should freeze, the meter will show either an increase or a decrease in the volume of gas passing. In most cases the change in delivery is very sudden and, upon inspecting the charts, it is very easily found. The charts showing a high or low delivery due to freezing are usually estimated, providing there has been no change in operations, such as shutting in of gas wells, changes in temperature, etc., by taking the average of the deliveries for the days preceding and following the estimated days.

One of the reasons why a meter will freeze is because of leaks in the gauge lines. If pipe dope is used on the connections in installing the meters, the lines will not leak. However, a tight gauge line will not prevent the meter from freezing on the inside of the casting. Very often when the differential makes a straight line on the chart, indicating that it is sticking, it is found upon examination that the straight line is due to the float freezing to the inside walls of the casting. Most of the companies that experience trouble with the meters freezing overcome this trouble by using meter houses and heaters.

The shrinkage of gas, due to a mixture of water, gasoline and gas flowing through the orifice, is one of the most difficult of the problems found in measuring gas. While this is not a new problem, yet it is one about which there seems to be very little known. A number of years ago one of the districts of a small company which had never shown any leakage commenced to show a large loss in the winter months. After calibrating the gauges, inspecting the discs, checking pressures, taking specific gravity of the gas, refiguring coefficients and inspecting the charts, the leakage in that district was not reduced. It was then observed that a large quantity of gasoline and water was condensed out of the gas on the discharge side of the meters. Very little gasoline and water had been trapped in the drips on the outlet side of the meters previous to the time when the leakage first started. Around the first of March the quantity of fluid caught in the drips began to drop off and the shrinking in that district decreased in proportion to the decrease in fluid until the loss in the line finally settled to its normal rate of leakage.

There is the case of another gas company that recently had a large shrinkage caused by a high measurement of the gas coming from the wells. The company did not keep an accurate record of the volume of gasoline and water which condensed out in the main line drips. However, the chart changers and line walkers who blew the drips daily found the drips to contain on some days approximately 100 barrels of gasoline and water.

The loss for this company started on about the fifteenth of November and lasted until March first, at which time the lines were again checking at their normal rate of leakage. During this time they did not make any changes in their measurements and did not repair any leaks in their lines.

Restricting the flow by throttling a gate on the inlet side of the meter will create a disturbance in the gas, which may give either a high or low measurement. Bends in the pipe lines, cutting discs and regulators ahead of the meter setting will form swirls and eddies in the gas. Straightening vanes are placed in the meter runs to straighten out the flow of gas, but there is a difference of opinion as to whether the vanes correct all or only a part of the errors due to disturbance.

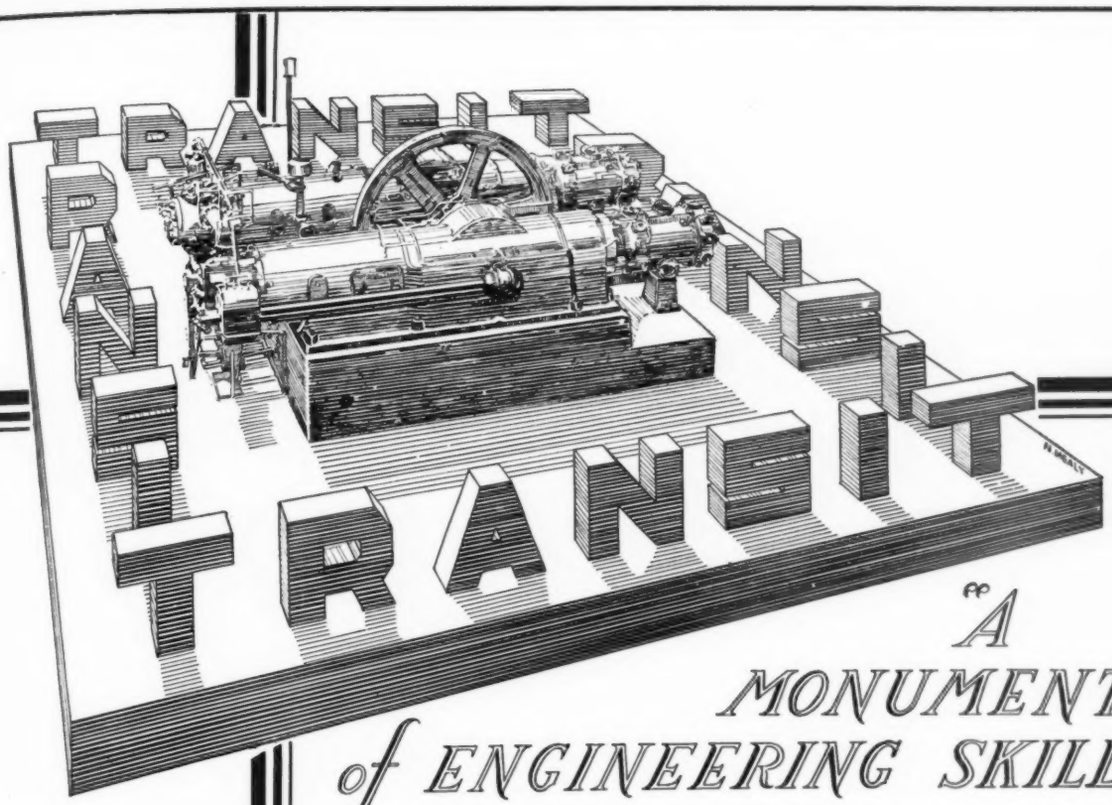
The impact from the engines at a compressor station when the meters are located near the station will cause the flow of gas to pulsate, resulting in a high or low measurement.

The orifice plate or disc is an important part of the meter and a great deal of attention should be given to seeing that it is kept in good condition. One of the errors found in measuring gas is due to the collecting of dirt on the inlet side of the disc. If the disc is placed in a line containing dirt and scrubbers have not been used to clean the gas, upon examination the inlet side of the disc will be found to be covered with dirt. This will give an erroneous measurement of the gas. Scrubbers are installed ahead of the more important sales meters and compressor stations in order to clean the dirt out of the gas on the lines that contain a large amount of dirt or rust.

Modern gas compressor station.

Leaks in Lines

As there are leaks in all of the pipe lines, the loss shown by a discrepancy report is assumed to be leakage, unless the meters are out of order or a mistake has been made in figuring the charts. If a line continues to show a large loss after the meters have been inspected and the accounting checked, it is



"A MONUMENT of ENGINEERING SKILL"

. . . an appreciative remark by an official high in the gas industry.

While visiting our shops recently, he looked this engine over pretty carefully.

Another encomium we can add to the already long list.

Bulletin 410-B yours any time

NATIONAL TRANSIT
Pump & Machine Co.
Oil City, Pa.

DISTRICT OFFICES
NEW YORK CLEVELAND PHILADELPHIA HOUSTON TULSA PITTSBURGH LOS ANGELES

Agents
FRICK-REID SUPPLY CORPORATION
Tulsa, Okla., or any store.

REPUBLIC SUPPLY COMPANY
of California
Los Angeles, California

E. L. WILSON HARDWARE CO.
Beaumont, Texas.

Agents
F. C. RICHMOND MACHINERY CO.
Salt Lake City, Utah.

REEVES & SKINNER MACHINERY CO.
St. Louis, Mo.

When writing NATIONAL TRANSIT PUMP & MACHINE CO., *please mention The Petroleum Engineer*

City border station.

then advisable to look over the line for leaks. When walking the line, leaks are sometimes found by observing the gas escaping into the air and by locating spots on the surface of the ground where the gas has destroyed the grass and vegetation. A large leak in the line will blow through the ground, where it will be noticeable to anyone passing by or walking the lines.

When a line has been walked without finding any leaks, the amount of leakage is then determined by making a shut-in pressure drop test. In making this kind of a test all connections leading to or from the line are blinded. After this has been done, a temporary connection is used to fill the line with gas and the pressure on the line is built up to its average working pressure when in service. The temporary connection is then blinded off and, after allowing sufficient time for the pressure to equalize, the drop in pressure is observed. A dead weight machine is used to measure the drop in pressure and readings are taken for every one-tenth of a pound drop. The temperature of the gas and barometer reading is taken in order to correct the volume in the line for changes in temperature and atmospheric pressure. Since the capacity of the line and the rate of change in pressure is known, the amount of leakage can be figured. If the line is new, the pressure may not drop more than one or two-tenths of a pound during the test. The lines which have a high rate of leakage will show a drop in pressure of fifteen or more pounds.

Errors in Accounting

It is important that the leakage in the lines be kept to a minimum, as the earnings of any company are directly affected by the volume of gas which is lost or unaccounted for, and a properly organized discrepancy department can very easily be the means of saving large sums of money each month for its company.

Mistakes in calculating the charts and in posting the figures are continually being made. Whenever a pipe line shows a large difference between the volumes measured into and out of it, the charts should be checked over for errors made in accounting. The party checking over the charts for errors should refigure the coefficient in order to be sure that it has been calculated correctly. In our organization the coefficient card is first filled out in the meter department. Then it is sent to the accounting department, where the coefficient is figured. It is then returned to the meter department, where the figures arrived at in the accounting department are verified. This method gives very good results, as we very seldom find that a mistake has been made in figuring the coefficient. The chart calculators in copying the coefficient on the back or face of the chart sometimes become a little careless and use the wrong coefficient. The comptometer operators often make mistakes in adding the extensions and multiplying the extension by the coefficient. Where the charts are computed by the customary hand method, the parties figuring the charts sometimes make mistakes in reading the pressure and differential lines. As the gas is measured on many different types of charts, the chart changer very often places the wrong type of chart on the meter. After this chart reaches the office and is figured, it is sometimes found that it has been computed according to the information shown on the face of the chart. If the charts are figured with the McGaughly Chart Integrator, many of the errors made by the parties figuring charts will be eliminated.

The discrepancy report for a company may be worked up to show the total amount of gas lost each month. As the gas is bought and sold on a different basis, the volumes are all reduced to the same base for comparative purposes. The difference in volumes between the total of the gas purchased and sold is then the amount lost. Most of the larger companies find it more practical and convenient to divide their system into a number of districts and carry a discrepancy to show the amount of gas lost or gained in each district.

The Cities Service Company has some three thousand one hundred miles of pipe lines and for checking purposes the system is divided into about one hundred and ten divisions. The discrepancy may be carried to show the loss in the district each month, or it may be carried to show the loss in the district each day. There are several advantages in carrying the discrepancy to give the loss for each day. One advantage is that if there is a change in the loss due to a large leak developing in the line, the change is at once noted and the leak repaired. The daily loss may on some days show large black or red figures, which are inconsistent with the average loss shown on the line. Upon examining the charts from the meters measuring gas into or out of the line, it is usually found that the change is due to either an error in measurement or accounting. This enables the company to find and correct its mistakes before the month's business is closed out. Our discrepancy department serves as an internal check on the gas accounting department. At the end of each month we are furnished with a copy of all purchase and sales invoices. The figures on the invoices are checked against the total deliveries on the daily discrepancy books, thus cutting down the possibility of an error in billing or in the total over all monthly leakage figures. It is possible for the discrepancy workers to find and correct enough errors to more than compensate the company for the cost of working up the figures on the discrepancy sheets.

Gas recording instruments in field use in Louisiana.

Drilling Conditions in the Pettus Field

By **HAROLD VANCE,** *Manager, Balance Oil Co.*

BEE COUNTY, in South Central Texas, has become the scene of an intensive drilling campaign, with the Pettus area receiving the most attention.

The discovery oil well in the Pettus area was drilled by the Houston Oil Company but was taken over by the Humble Oil and Refining Company. It is located about a mile east of the town of Pettus and has been producing since last December. The initial production was 700 barrels with an initial gas-oil ratio of 1100 cubic feet of gas to the barrel. Production has recently dropped to 125 barrels and the gas-oil ratio has increased to 2750 cubic feet to the barrel. The completion of a number of offsets may account for the drop in production.

The oil produced in the Pettus field varies from 35 to 48 degrees A. P. I. gravity with a large part of the oil running from 45 to 48 degrees. Initial production of wells ranges from 300 to 900 barrels per day. Gasoline content tests have shown 0.9 gallons of gasoline per 1000 cubic feet of gas. Casing pressures vary from 1200 to 1400 pounds per square inch and tubing pressures from 600 to 900 pounds per square inch.

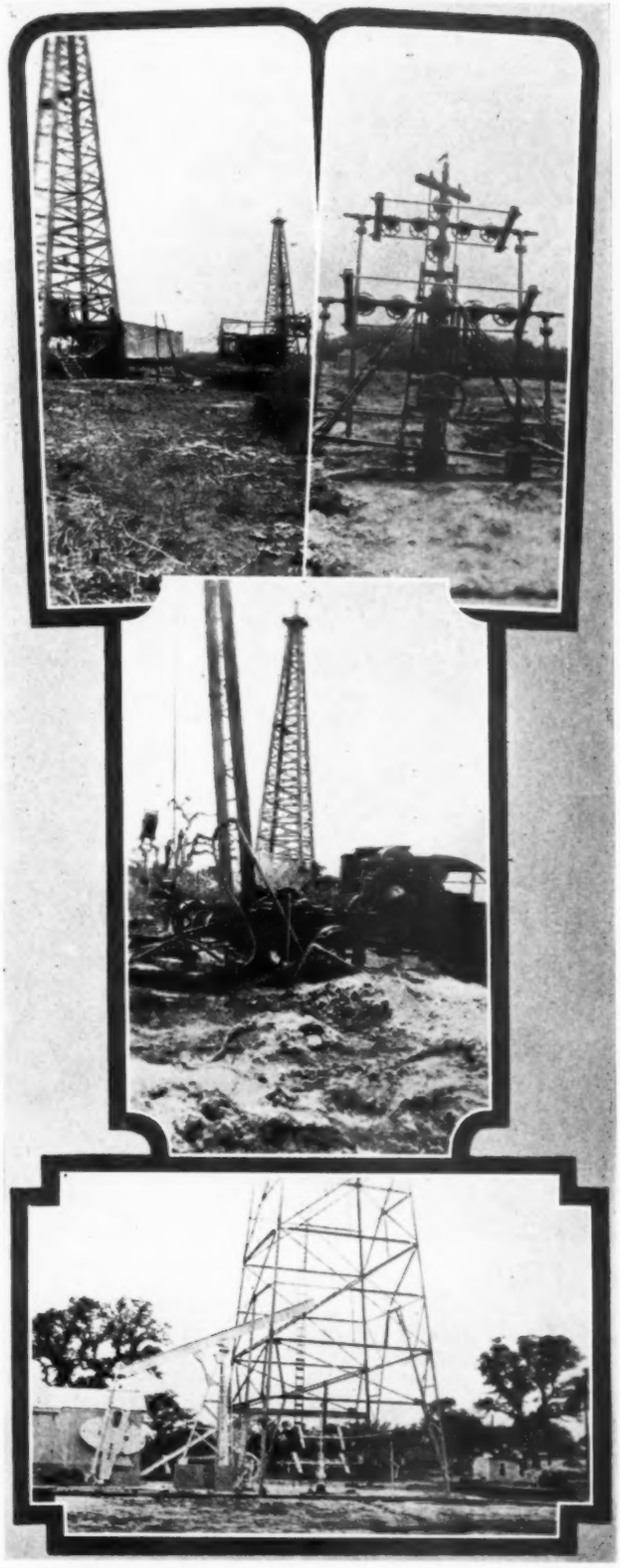
About twenty-five wells are now being drilled in the Pettus area. Well depths range from 3500 to 4000 feet and approximately thirty days are required to complete a well in the proven area. The core barrel and sand tester are playing an important part.

In drilling it is general practice to set 10-inch casing below the first water sand which is encountered from 300 to 600 feet. Drilling is then continued to a point above the pay, when a 6-inch core barrel is generally run to determine the top of the sand. In areas where there is any question as to the content of the sand cored, a sand tester is used. After the sand is cored and its contents determined the hole is reamed down to the casing point. This point is determined by coring. The casing is then set and cemented on the shoulder above the top of the pay. After the cement has set it is drilled out and the hole drilled or cored to its total depth. Screen pipe is then set opposite the pay with a blank joint extending up into the oil string. Four-inch screen is usually set in 6⅝-inch oil string. Either 2 or 2½-inch tubing is run and the well washed. After the christmas tree is assembled the well is either swabbed in or brought in under pressure. The Humble brings all its wells in under pressure by connecting the casinghead of the new well with the casinghead of a completed well. After the new well has started to flow the gas from the second well is shut off and the new well allowed to flow under high back pressure.

All wells are flowing through tubing except those of one company which makes a practice of flowing its wells between the casing and tubing. Practically all types of chokes are being used and very little trouble is experienced with cutting as the wells produce very little sand.

One company recently has completed a gas well in the Townsite area capable of producing 20,000,000 cubic feet of gas and 30 barrels of 76 gravity gasoline per day. The gasoline is so free from odor that it finds a ready market in the dry cleaning industry at $16.00 per barrel.

The subsurface of the field is still unknown although the limits of the field are practically defined to the south and the present trend is almost east and west, with producing wells extending over a distance of seven miles.



Top, left—Electric rig. Top, right—Typical well hook-up in the Pettus field (note tubing retractor). Houston Oil Co. Townsite well. Center—Portable rotary used for drilling water wells in the Pettus field. Bottom—Discovery oil well in the Pettus field, Humble Oil and Refining Co. No. 1 McKinney, depth 3871 feet.

General Construction and

Drilling Conditions in

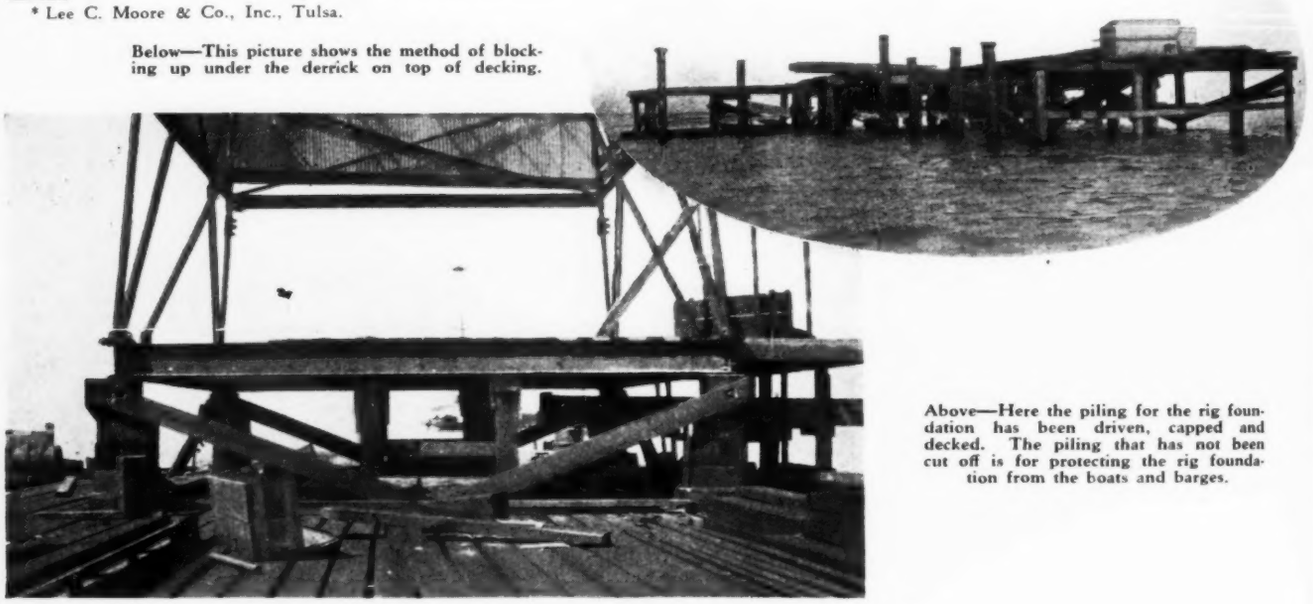
ONE usually thinks of living in the Tropics as being lazy and easy going, where life's hardest problem is to find some cool spot where the hot hours can be whiled away in some degree of comfort. This conception would have been correct until oil was found in commercial quantities in Colombia and Venezuela. Now there is the usual hustle and bustle that accompanies any oil boom. The terrible rush to reach the pay sand before the other fellow has transformed the characteristic easiness of the Tropics into a veritable hive of human bees.

There are three major producing companies in the Maracaibo Basin, namely: The Lago Petroleum Corporation, a subsidiary of the Standard of Indiana; the Venezuela Oil Concessions, subsidiary of the Royal Dutch Shell and the Venezuela Gulf Oil Company. These three companies are all producing oil in great quantities from the Lagunillas, LaRosa and Ambrosio fields.

The LaRosa field is the oldest of the three and in this particular field the concessions were held by these three aforementioned companies. The Venezuela Gulf Oil Company's concessions were large rectangles laid out on the surface of Maracaibo Lake. These rectangles were approximately 500 meters wide and 3,500 meters long. The concessions of the Lago Petroleum Corporation consisted of the remainder of the lake, namely, that area of the lake which lay beyond the outside boundary of the Gulf's rectangles, the area between the inside boundary of the rectangle and the coast line and the area between two adjacent rectangles. The Venezuela Oil Concessions owned all the land.

One can easily imagine the line fight that such an allotment of concessions would bring about. Every company had to have an air-tight organization, the parts of which had to click perfectly in order to stand any show of reaching the pay before the high but short lived gas pressure had been dissipated. Every man was expected to put forth his best and every man did, because there was the inspiration of seeing your company ahead, and the drive created by seeing your company behind, in this naturally established program.

* Lee C. Moore & Co., Inc., Tulsa.



Below—This picture shows the method of blocking up under the derrick on top of decking.

Above—Here the piling for the rig foundation has been driven, capped and decked. The piling that has not been cut off is for protecting the rig foundation from the boats and barges.

Panorama of LaRosa Field, Maracaibo.

Lake Maracaibo

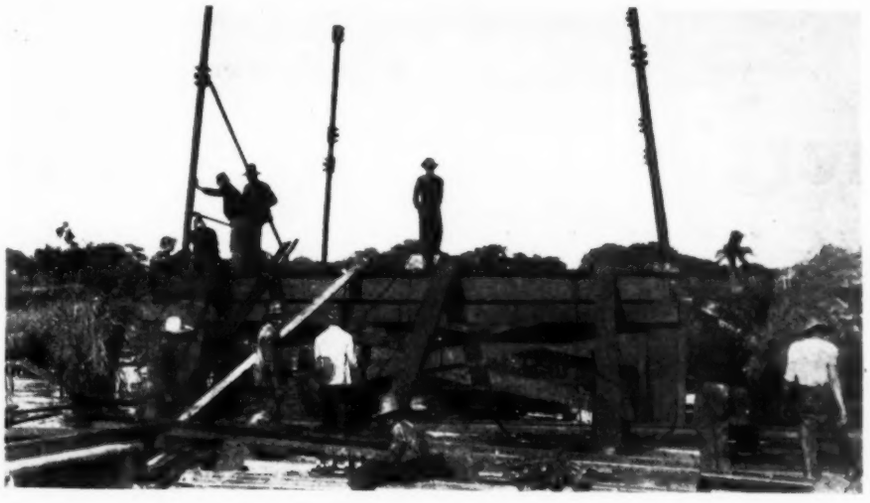
By H. J. WOOLSLAYER, Field Engineer*

The Gulf and the Lago companies faced what was probably the most unique problem—that of drilling over the water. Up until June, 1929, the deepest water over which a rig had been built was 45 feet. The latter part of 1926 the deepest water under any lake location was 29 feet. This was L-101 of the Lago Petroleum Corporation. The Lago Petroleum had to face the problem of drilling over the deepest water because its concessions carried farther out into the lake than those of the Gulf company, whose concessions were limited by the boundaries previously mentioned. The Lago company located its wells on the vertices of equilateral triangles whose sides were 300 meters in length. The wells were lined as straight as possible over any particular field.

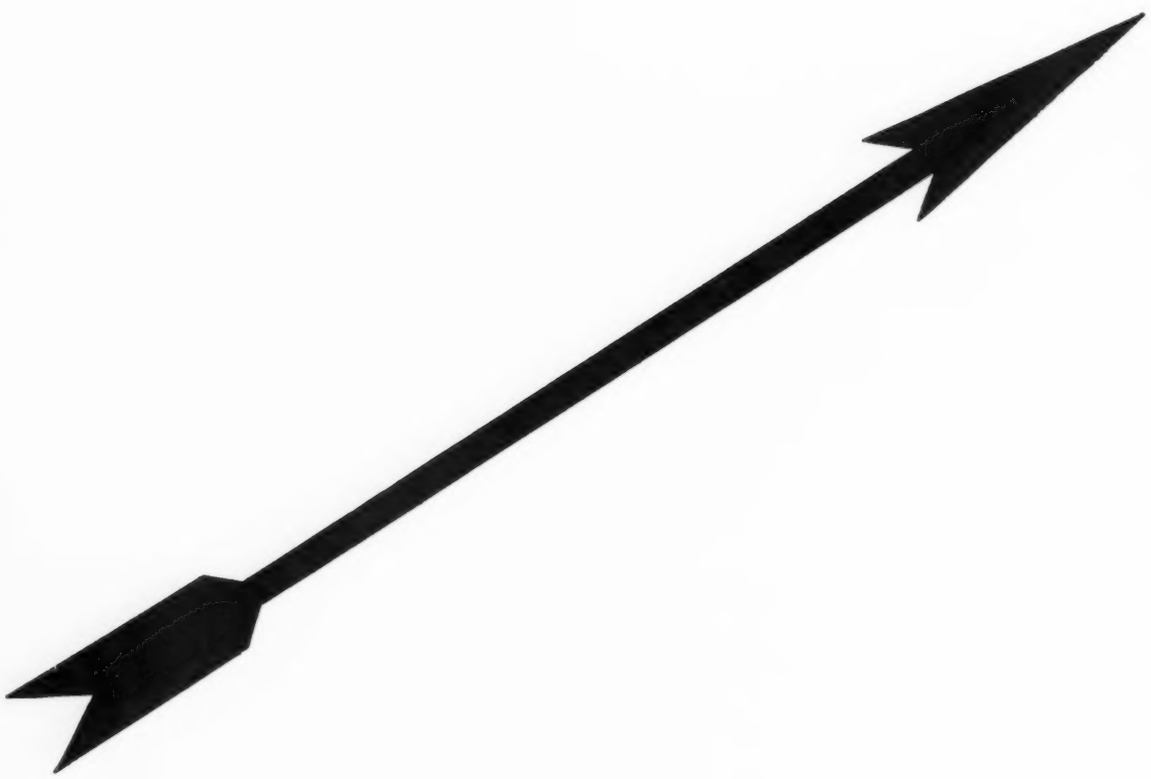
The regular history of any Lago well is as follows: First, the geological department would send to the field the instructions to locate a particular well, giving the co-ordinates of the well with references to some established monument. With these co-ordinates the surveyor would calculate the angle and distance or two angles from two convenient points whose co-ordinates were known. These two points were usually two old wells. The angle method of locating a well was the most common. This was done by the use of two transits. A boat would start out from one transit, being kept in line, as near as possible, by means of signaling, and proceed until it had intersected the line of the second transit. At this point a joint or two of two-inch pipe was driven into the lake bottom for a stake. Great difficulty was encountered in this particular part of the location procedure because of the roughness of the water and the inability to maneuver the boat accurately. To insure a greater degree of accuracy in the location of a stake an actual survey to determine the exact location of this pipe stake was made. It was determined then by calculating the extent and direction of any error that might exist. The actual location was then made by correcting the cal-

Above—Driving posts in shallow water for walk-way between derricks.

Above—Derrick floor of the Gulf Company's wild cat.



At right—The foundation for a rig on the shore line on Maracaibo Lake.



Commercial Department

OKLAHOMA GAS AND

J. F. Owens, Vice President and General Manager

When writing Oklahoma Gas & Electric Co. *please mention The Petroleum Engineer*

Significant of the growth of electrification is the fact that approximately 25% of the oil recovered in the Seminole area is produced by ELECTRIC POWER.....

BYLLESBY
OKLAHOMA GAS AND ELECTRIC COMPANY
PIONEERS IN PUBLIC SERVICE

ELECTRIC COMPANY

Courteous, Personal Attention to Every Customer

Oklahoma City, Okla.

When writing OKLAHOMA GAS & ELECTRIC CO. *please mention The Petroleum Engineer*

culated error. As soon as the location was made a steam pile-driver on a barge was towed in. The pile-driver, after running the necessary wharfing lines, would proceed to drive piling for the rig foundation. Usually 95 creosoted pine piles about 45 feet long were used under the derrick, engine and pumps. And about 55 pilings of cheaper grade were used under the pipe rack, walk, mud box, part of the boiler station and fuel station. These piles were driven to a penetration of about 15 feet. This penetration, however, varied greatly for different locations. In one particular instance there was no penetration whatsoever, and as the piles were hammered they broomed out at the bottom. The rig was built, however, on this location and proved to be satisfactory. On still another location there was no limit to the penetration of the piles. That is no limit to the penetration that could be reached by the longest piles obtainable. In this case the piling was run into the soft sand and silt on the lake bottom by just weight of the steam hammer on the pile-driver. No blows were struck. The piling was stopped when the top of it had reached the desired elevation with respect to the surface of the water. It was found that after these piles had set for an hour or two that they could be driven but one-half inch by several hard blows of the heavy steam hammer. A rig was also built on this foundation and was satisfactory.

Driving piling for a rig foundation.

As soon as the driving of the piling foundation was completed a rig building crew would move on to the location. The top of the piles were pulled to the desired location, cut off at an elevation of about nine feet above the surface of the water and capped with 12x12-inch timbers. The entire rig foundation was then decked with 2x12-inch lumber. On this deck the derrick was built, the corners of which were set up on 16x16-inch blocks about four feet long. The 122-foot rotary derrick with 24-foot base was used almost exclusively for drilling wells over water. Under the deck and above the surface of the water the foundation was sway-braced by 2x12-inch lumber, bolted directly to the piling. There were no braces whatsoever below the surface of the water.

This arrangement made a very satisfactory foundation for a rig. However, the practice had to be abandoned because longer creosoted piling demanded by the ever-increasing depth of the water were not obtainable and also because the "Teredo" attacked the wood piling. In many instances, boiler stations, flow stations and fuel stations toppled over into the lake because the piling had been rendered so weak by the boring of this small but destructive shipworm. For these reasons precast concrete piling were resorted to.

Practically the same procedure as described above is followed in building the concrete foundations. The deck is reinforced concrete and the derrick is blocked up by means of a steel sub-base about five feet high. This gave a rigid and long lasting foundation.

Another of the unique problems of the lake operations is that of transportation. Materials were moved to a location by means of large steel barges, pulled by Diesel-engine powered tug boats. The tremendous investment for transportation of equipment can be appreciated. However, it was seldom if ever that transportation to any particular rig or location was impossible. Sometimes the roughness of the water hindered transportation and made the spotting of a barge difficult, but there was never the problem of bad or impassable roads to be met. Each department head had his own speed boat that could take him safely and rapidly to any location on the lake.

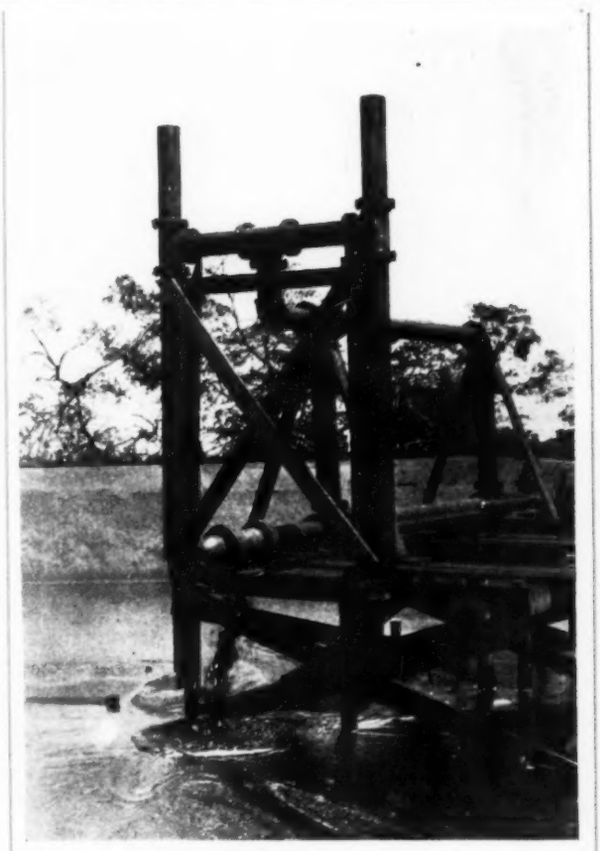
However, they do face a problem in transporting the crude oil from Maracaibo Lake Basin to the sea, where it is transferred to larger ocean-going tankers. The tankers in which the oil is shipped out of the basin are about 16,000-barrel capacity and are of flat bottom construction. They are designed so as to be able to make maximum speed because there are only so many hours out of each day that the water over the bar between Maracaibo Lake and the sea is of sufficient depth to allow the passage of a large boat. Just so many lake-going tankers can cross in 24 hours. This, and this alone, has regulated the number of barrels of oil produced daily from the Maracaibo fields.

Gulf well blowing out sand and water from about 350 feet.

All wells in the Maracaibo Basin were drilled by rotary equipment. In the LaRosa field the wells were drilled to a depth of 2,700 feet, at the Lagunillas field to approximately 3,400 feet, and in the Ambrosio field from 1,200 to 1,600 feet deep. These wells were drilled in approximately 30 days. The entire strata were sandy and the going was comparatively easy. There are

two pay sands: the Santa Barbara sand and the LaRosa sand. In some wells both these sands were produced by setting a double string of perforated pipe; however, in most wells one sand or the other was produced. The oil is of low gravity, being from 18 to 21 A. P. I. It was of high sand content and flow pits had to be constructed so as to allow the sand to settle out before it was pumped to the storage tanks. Wells would come in with a production of 10,000 barrels. This varied somewhat, some wells coming in at five and some at twenty thousand barrels. All the wells were flowed through a three-quarter or a one-inch choke, in order to keep the well from blowing too much sand and choking itself up too quickly. A very high gas pressure had to be dealt with.

In one instance, L-34 to be exact, the side of the master gate was blown out and a stream of oil estimated at 35,000 barrels shot out horizontally over the lake for a distance of approximately 300 feet. In this case a fence was made of heavy canvas one yard wide. About one foot of the canvas was submerged below the surface of the water, allowing two feet sticking out of the water. Nearly all of the oil that was produced was recovered—for, of course, it stayed on top of the water and the canvas fence kept it from spreading. This well was placed under control by pouring a large concrete block around the head connections.



Oil flowing into the pits.

Another interesting piece of work was that of extinguishing the burning well, L-18, at LaRosa. This well had been burning for approximately two weeks, during which time every conceivable idea for putting out the fire was given a trial. Of course, the first thing to burn was the wood foundation. This allowed the rig to fall into the lake, and when the derrick fell the head connections on the well were broken off leaving about two feet of the casing sticking above the water. The successful method adopted here was as follows: The water was approximately 12 feet deep at the well. There were three strings of casing and a flow string as follows: a 15½-inch surface casing, a 10-inch string and an 8¼-inch string, then the four-inch flow string. A two-inch drill was rigged up on an old man and clamp to fit around the casing. At this point the services of Eddie Robertson were called for. Robertson, at this particular time, was assistant to S. E. Gibbson, chief rig builder of the Lago Company. It was commonly known around the camp that Robertson had had some diving experiences in the U. S. Navy. He took the two and one-half inch drill and clamp and was lowered to the bottom of the lake.

He then walked up to the burning well, put the clamp around the casing and commenced to drill through. It was originally intended that this 2½-inch hole in the casing strings was to be used to make some sort of connection through which mud or water could be pumped to the sand—thus choking the flow. However, as soon as the 8¼-inch string was drilled through there was such a vacuum created by the rush of oil up through the flow string that the lake water was pulled inside the 8¼-inch and down the outside of the four-inch flow string, thence up inside the flow string snuffing out the fire.

The companies operating in the Maracaibo Basin, South America, are doing everything possible to make it comfortable for their men. Nice clean, well ventilated, bunkhouses with shower baths, clean beds and every convenience are provided. In the messhall the best food obtainable is prepared and served, with the greatest care as to cleanliness. In most every large camp there is a clubhouse where the men can get together to enjoy a cold bottle of beer, etc. In these clubhouses once or twice a week a dance is held and it is usually a real event. Now the companies have even gotten to providing outdoor moving pictures twice a week. All this social life and recreation is profitable to both the employer and employee, because the employee is kept in a happier frame of mind and the more recreation a man finds inside the camp gates the better producer that man will be.

Each company has its own ball team A league has been formed and games are usually played on Sunday. These games have aroused some real interest. They are regarded with far more importance than we in the States regard our big league ball games.

The writer has taken one trip to the Colombian oil fields, flying up the Magdalena River from Baranquilla to Barenca Barmeja, the terminal of the Tropical Oil Company. Barenca Barmeja is about 600 miles up the river. The flying time is about five hours. The German Air Line operates regularly scheduled planes over this route. The journey from Barenca Barmeja to El Centro, the oil field camp proper of the Tropical Oil Company, is made on the company's own railroad. Here is probably witnessed the best organized of all oil camps.

Operating is not competitive, for the Tropical Oil Company has the concessions, so that every phase of efficiency and economy can be carried out without the endurance of abnormal speed called for under competitive operating conditions. Bart Meyers, former resident of Oil City, Pa., is in charge here and his organization is very complete. They have their own power plant to furnish power and light to the camp buildings.

The company's own machine shop is maintained, in which probably almost anything can be made.

I have made three trips to South America and each time have witnessed wonderful strides in advancement. At this pace, in a very short time Venezuela and Colombia will offer as many conveniences and comforts as can be had anywhere.

Unusual Method of Developing Water Supply

Clamshell digger just after coming out of hole.

Testing a newly-completed well by means of a tractor as power.

THE Indian Territory Illuminating Oil Company is devoting a great deal of care to the development of a tract of ground as a water supply.

The summer drouth has so reduced the amount of water in the Canadian river, running along the north edge of the Oklahoma City field, that it is not sufficient to meet the demand made upon it. Ed Klopfenstein, petroleum engineer with the company, was assigned the duty of finding a sufficient water supply to care for the oil operations, and is now in charge of the development of this source.

After coring considerable territory it was decided that the old Canadian river bed channel, lying approximately one-quarter of a mile north of the present channel, offered the best water source. Consequently a surface rights lease was taken upon a tract of ground covering a considerable portion of the old river channel.

The results of operations in the area have proven that it was a wise choice. The Indian Territory Illuminating Oil Company has the richest water lease in the Oklahoma City field. Thus far five wells have been completed on the tract, each of which is capable, by means of an electric turbine pump, of making 600 gallons of water per minute, or 20,000 barrels of the fluid every 24 hours. This flow is equal to the oil production of some of the large oil wells being completed in the area.

Although the lease was previously cored, each location is tested before the holes are dug. This is accomplished by a portable coring outfit that sinks a two-inch hole to the producing horizon.

The depth of the producing formation is from 40 to 50 feet below the surface of the ground. This is dug out by means of a clamshell operated by a gas motor engine. The clamshell is rigged up on a light steel, portable rig affair, which can easily be moved to another location as soon as a hole is completed.

Four sizes of casing are used in the finishing of these

Crew pulling casing down into hole by means of the lever.

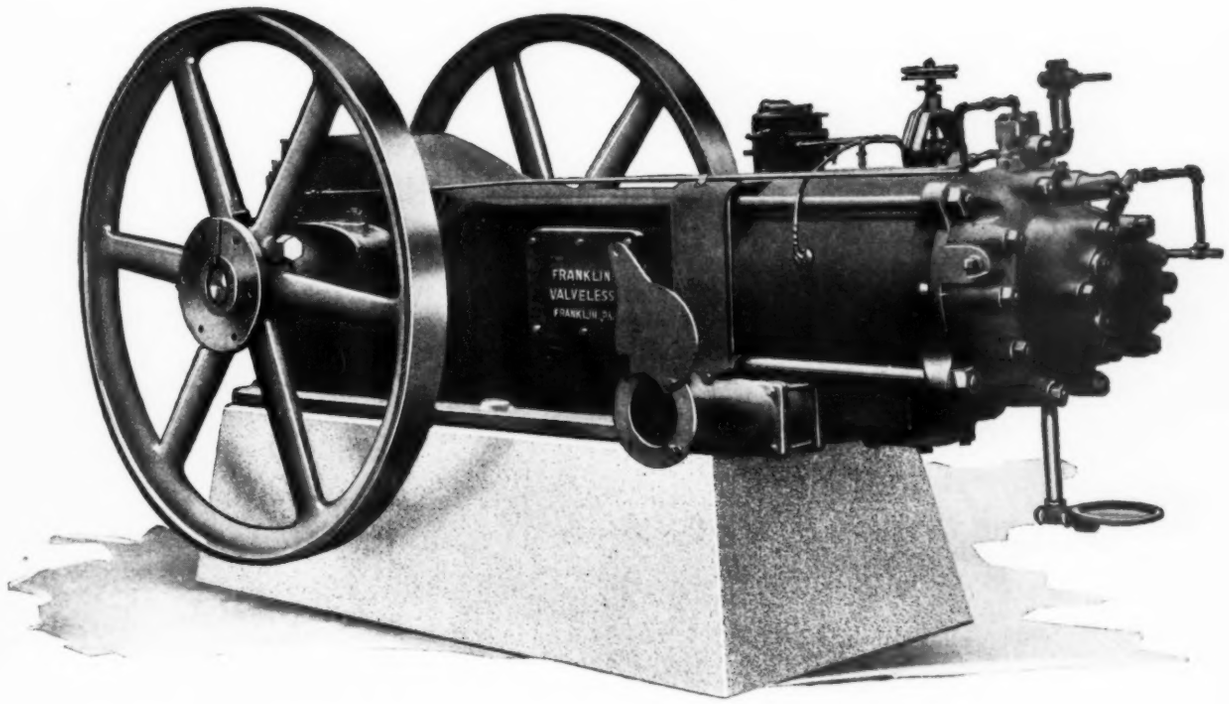
No Gas?

The Franklin Valveless Oil Engine will handle the load . . . .

If your natural gas supply is exhausted, the cheapest power in the world you can use for drilling, pumping or central power loads is the Franklin Valveless Oil Engine, the most popular oil engine in the oil fields and the one which is standing the gaff of time and trial by experienced power users.

Franklin Valveless Engine Company

FRANKLIN, PENNSYLVANIA



Distributed by

OIL WELL SUPPLY CO.

When writing FRANKLIN VALVELESS ENGINE CO. *please mention The Petroleum Engineer*

holes. The first string, or surface string, consists of 42-inch diameter galvanized casing. This is set to a depth of from 12 to 18 feet, depending upon the thickness of a quicksand formation on the surface. The hole is then reduced to 38 inches and carried with this diameter as far as the formations will permit. The hole is finally completed with a 34-inch diameter pipe, after which a string of heavy casing, used as the flowing string, is set. This is 18-inch pipe, with the bottom 20 feet perforated. The 18-inch string is set on the bottom of the hole.

Because of the softness of the formations it is necessary to run the pipe as the clamshell digs out the dirt. A simple contrivance has been rigged up for this work. The projecting upper end of the casing is fitted with a block on two sides. A cable is run through this block, attaching on one side to a stationary heavy timber that is fastened down, and on the other side to a piece of pipe. This pipe is turned by means of a long pole, wrapping the cable around it and drawing the pipe down into the hole.

The softness of the formation causes considerable sand to come into the hole, consequently the setting of the flowing perforated string of pipe. To further overcome the entrance of sand, and to prevent the leaving of so much casing in the hole, screen gravel is dumped in between the 34-inch and 18-inch string. The entire distance from the surface to the bottom of the hole is filled. The 34-inch and 38-inch strings of casing are then pulled, leaving only the 42-inch surface pipe, besides the 18-inch flow string.

Because of the flooding of this area when the river overflows, the pumps are being set up about ten feet on concrete platforms. Electricity has been carried to the pumps by a newly-constructed line.

The lease is not being fully developed at this time and appears good for a much larger production, should it be needed. Another feature is the salvaging value of all the equipment.

Hook-up by which the casing is pulled downward into hole.

One of coring machine crew standing on pipe while operating the bailer.

Section of the 42-inch casing.

Running bailer into hole in the coring outfit.

Anti-Knock Motor Fuels

By

LAZAR EDELEANU *and* WOLFGANG GROTE, *Berlin*

THE importance of non-detonating motor fuels is generally recognized today. Most straight-run gasolines are not of the so-called non-detonating quality. It is therefore not surprising to find that in all parts of the world specialists have attempted to obtain satisfactory fuels. Some of the methods used are described below.

In the laboratories of one of the largest automobile companies in the United States—namely, the General Motors Company—a great many different compounds were investigated. Iodine as well as organic chlorine and bromine compounds were tried by adding them in small quantities to gasoline. Finally it was discovered that quite a different material—lead tetra-ethyl—was the most favorable. Several hundredths per cent of this compound were sufficient to produce a non-detonating gasoline from any stock which could be utilized at compression ratios of 1:5 and more. The Ethyl Gasoline Corporation, a corporation owned by General Motors and the Standard Oil Company of New Jersey, was formed for the purpose of marketing tetra-ethyl lead mixed with ethylene dibromide. This company lays down very stringent conditions under which its product may be sold as regards physical properties of the gasoline to be mixed with tetra-ethyl lead, quantity of lead permissible, etc. Tetra-ethyl lead is the best known method for controlling detonating gasolines.

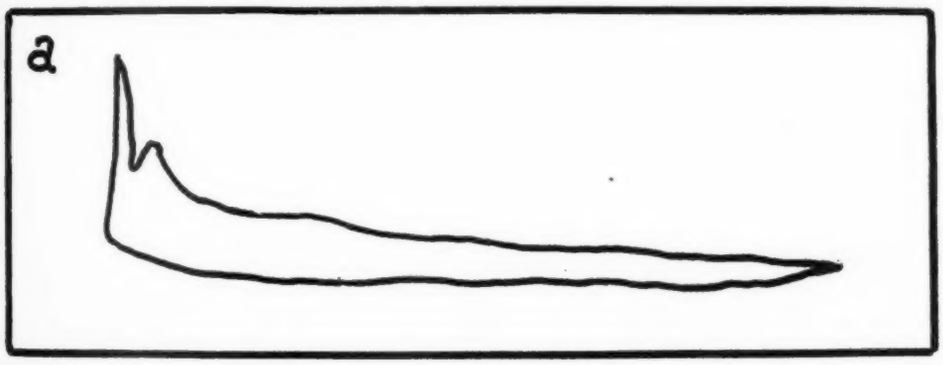
Later the I. G. Farbenindustrie found a quite different new non-detonating agent in iron pentacarbonyl. Owing to its affinity for CO it, too, is poisonous. Its use in European countries was permitted, but it did not become as successful as originally expected, owing to the formation of iron deposits in the motors. Different again was the solution of the problem based on the use of benzol and its derivatives, which strongly suppress detonation. While before the war aromatics in gasoline were considered undesirable, today we take the opposite stand. The effects of aromatics as detonation inhibitors are decidedly efficacious. However, the use of benzol is dependent on the production, e. g., Germany in general might cover her demands, owing to her highly developed by-products industry (coal, coking and gas industries). Such a solution, however, is not adequate for a country having a very large number of automobiles, as in the United States.

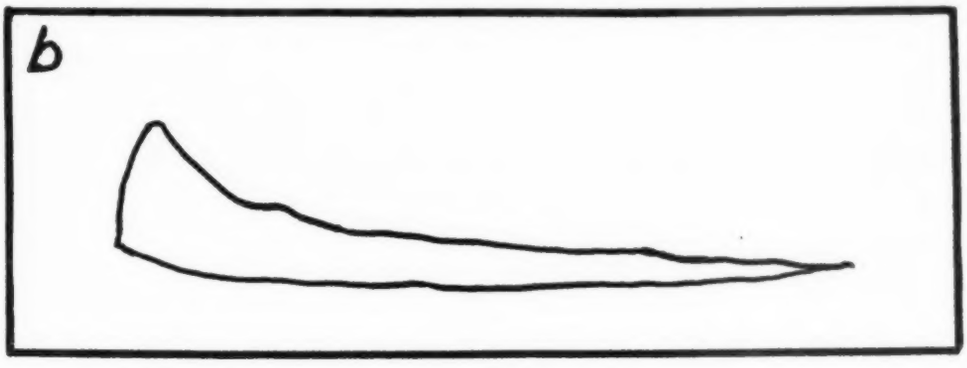
This article is translated by Dr. Walter Kain and Robert L. Brandt. It appeared in "Brennstoff-Chemie," Essen, Germany, No. 11, Vol. II (1930).

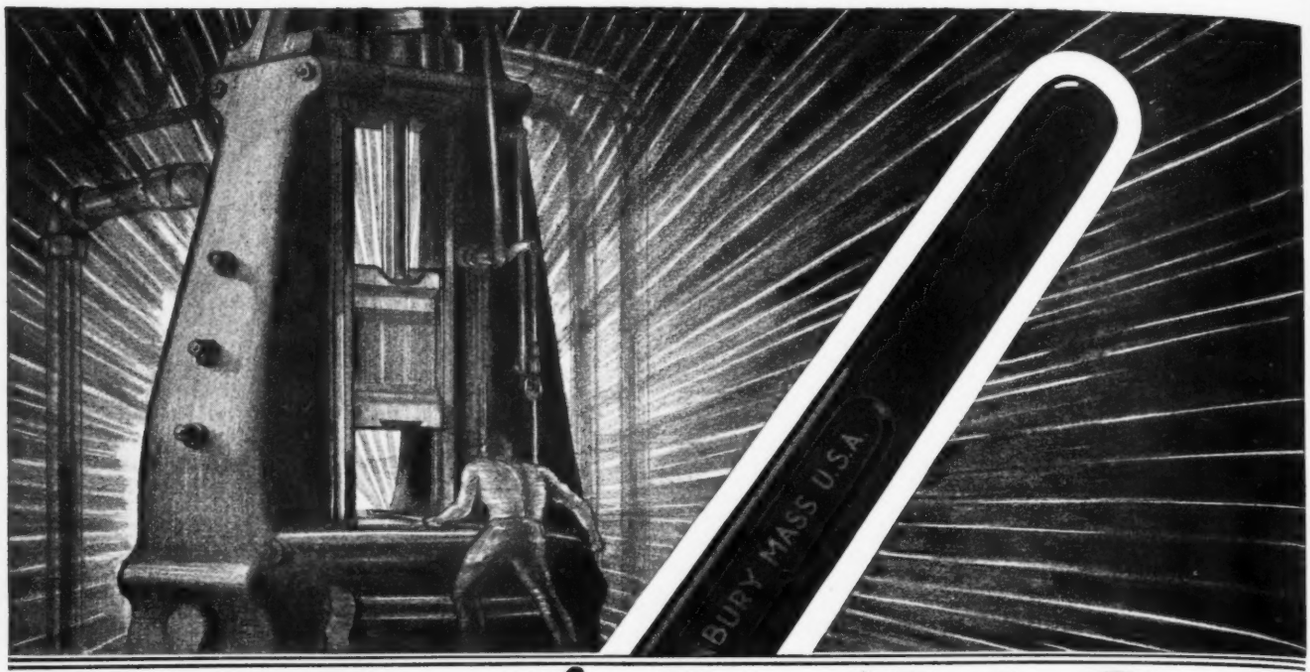
Recently petroleum refiners have been interested in removing gum and sulphur compounds by treating without destroying the anti-knock properties of their gasoline. The authors demonstrate the value of sulphur dioxide in treating cracked gasoline.

The SO_2 extracts from petroleum distillates resulting from the application of the Edeleanu refining process consist mainly of aromatic and unsaturated hydrocarbons. It is possible, therefore, to produce non-detonating gasoline by distilling extracts obtained from kerosenes and adding the lower boiling fractions to gasoline. Unfortunately, this method is not able to supply the demand, so it became necessary to search for still other sources. In spite of the fact that cracked gasolines contain a higher content of unsaturated and aromatic compounds than straight-run gasolines, still their anti-knock values are not high enough for use in modern high compression motors.

Here a further application of the use of SO_2 came to hand. It was found that in the case of saturated gasolines those hydrocarbons boiling between 175 and 220 degrees C. (347-437 degrees F.) were mainly responsible for knocking. A solution of the problem of increasing the anti-knock value of gasoline and especially of cracked gasolines without the addition of materials not found in the original crude







Drop Forged---*Not Cast*

-----another reason why TRIMO is an exceptionally good pipe wrench

THE HANDLE of all steel TRIMO is drop forged not cast. It is a good point to remember when picking a pipe wrench —and a satisfactory thing to know when you put all your strength behind the pull.

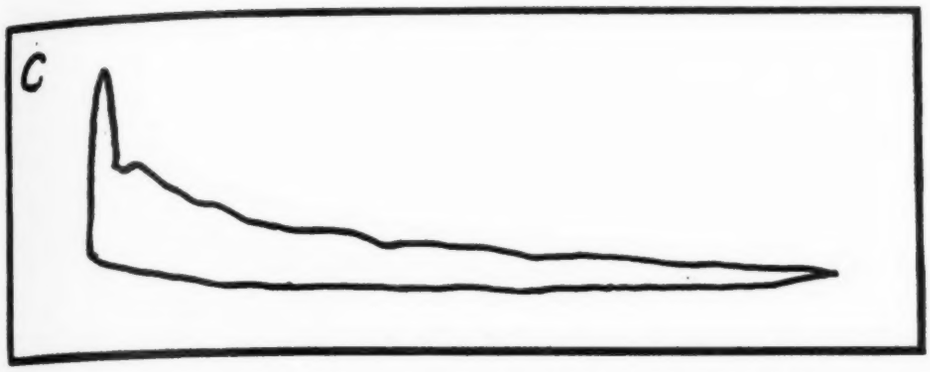
It would be easier for us to make the handle of cast iron, but it would be easier for you to snap that handle in two if we did.

No pains are spared to make TRIMO the safest, strongest, longest living wrench on the market. It is the right choice for any job in the oil fields.

TRIMO TRIMO Pipe Wrench

Made by Trimont Mfg. Co., Inc., Roxbury (Boston), Mass.

When writing TRIMONT MFG. CO., INC., *please mention The Petroleum Engineer*



oil consists of applying the SO_2 process, which was originally only intended for use in kerosene and later in lubricating oil manufacture. It is accomplished by separating the fraction of pressure distillate boiling between 175-220 degrees C. (347-437 degrees F.) by distillation, treating this fraction with liquid SO_2 and blending the SO_2 soluble material (extract) with the hydrocarbons boiling under 175 degrees C. (347 degrees F.). This results in a fuel from which the chief detonating agents have been removed and whose contents of aromatic and unsaturated parts have been increased. At the same time the volatility of the fuel is increased. In order to compensate for loss of gasoline as such (by eliminating high boiling saturated compounds) it is possible to cut at 230 degrees C., or even higher.

This procedure for producing non-detonating motor fuel has met with great interest. In the United States a number of the large petroleum companies have tested the qualities of gasolines produced in the above manner. In the following a few results are given.

1. Single-Cylinder Engine Dynamometer Test

A one-cylinder engine directly coupled to a D. C. generator was used in these tests. Various fuels were tested under constant operating conditions with the engine running at 500 r. p. m. Cylinder wall temperatures of 80 degrees C. were maintained constant by a water-cooling system. The compression ratio was 1 to 4.93. Power developed, indicator diagrams and degree of knocking were recorded. The following fuels were tested. (See diagrams.)

a) American standard gasoline.
b) American standard gasoline plus 0.08 vol. % (0.16 weight %) lead tetra-ethyl and 0.05 vol. % ethylene dibromide.
c) Cracked gasoline.
d) Cracked gasoline treated with SO_2 as described previously.

Results (see Table 1).

2. Mechanically-Braked Engine at Various Speeds

For these tests an engine, compression ratio 1 to 5.1, was used. Temperature of cooling water discharge, 77-88 degrees C.; carburetor temperature, about 70 degrees C. Brake horsepower and knocking were determined at various speeds. Absence of knock is given a rating of 0, a strong knock 10, soft knock 1, a persistent knock 2, etc.

The tests were run in duplicate and averaged. Table 2 shows the averaged results.

The following fuels were used:

a) Gasoline containing lead tetra-ethyl.
b) Gasoline containing no lead tetra-ethyl.
c) Gasoline prepared by treating with SO_2.

The results shown for fuel (c) would have been still better were it not for the comparatively high content of high boiling hydrocarbons.

The experiments as described above indicate the value of the SO_2 process in this connection. It is, of course, understood that the value of the process depends on the physical and chemical nature of the cracked gasoline. The properties of the cracked gasoline are dependent on the type of the original charging stock as well as actual cracking conditions. It is easy to see that the best results obtain when the fractions boiling over 175 degrees C. are rich in aromatics. This may be determined only by experiment.

Finally, the sulfur content of cracked gasolines is to be mentioned. As is known, the SO_2 extracts are richer in sulfur compounds than the SO_2 insoluble hydrocarbons. Accordingly, there is a relative increase as such in sulfur, and at first glance this is highly undesirable. However, it must be taken into consideration that in any case the sulfur must be removed, and cracked gasolines are always treated for sulfur removal. It will be realized that the slight increase in sulfur content is of no consequence from this standpoint.

TABLE 1

Fuel	Voltage
a	275
b	279
c	276
d	280

Amperage	H. P.	Cylinder Temperature, Deg. C.	Remarks
12.7	4.66	80	Knocking badly
12.9	4.82	80	Not knocking
12.7	4.69	81	Knocking
12.7	4.79	80	Incipient knocking

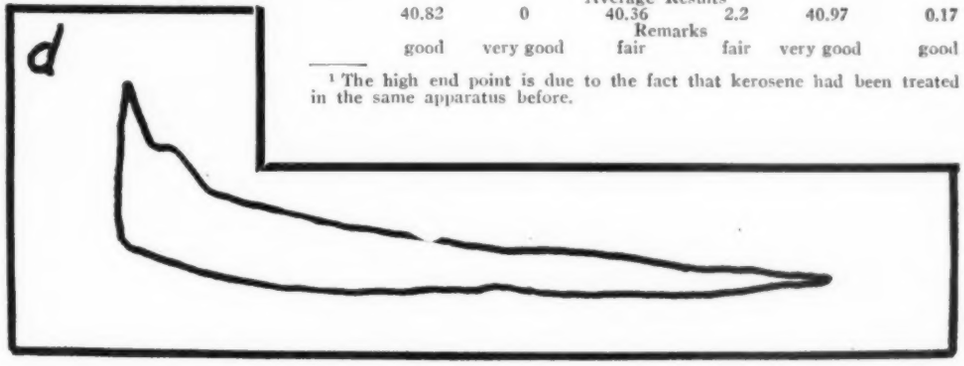
Fuel (d) showed a marked improvement over fuel (c). Knocking was only at the incipient stage, while the power developed practically equalled that of the fuel (b). Indicator diagrams show (d) to be similar to (b)

TABLE 2

Fuel	a	b	c
Sp. Gr.	0.755	0.760	0.777
Initial	37° C.	47° C.	49° C.
10%	72°	83°	77°
30%	104°	104°	107°
50%	127°	128°	131°
70%	148°	148°	156°
90%	186°	186°	198°
95%	208°	207°	225°
E.P.	219°	220°	243°

R.P.M.	H.P.	Knock Rate	H.P.	Knock Rate	H.P.	Knock Rate
1800	54.00	0	55.70	0	54.60	0
1600	51.20	0	49.86	0	50.66	0
1400	45.38	0	45.49	1	45.73	0
1200	39.20	0	38.26	2	39.40	0
1000	31.83		30.33	4	31.94	0
800	23.33	0	22.50	6	23.46	1
			Average Results			
	40.82	0	40.36	2.2	40.97	0.17
			Remarks			
	good	very good	fair	fair	very good	good

[1] The high end point is due to the fact that kerosene had been treated in the same apparatus before.



HEN YOUR FISHING PROBLEMS BECOME SO DIFFICULT THAT OUTSIDE SUGGESTIONS ARE NECESSARY . . . .

CONSULT HINDERLITER

The only practical and experienced personnel familiar with oil field requirements, organized to meet the needs of the industry.

Greatest variety and comprehensive stocks of ROTARY AND STANDARD CABLE Fishing Tools, available for prompt delivery.

The only Company maintaining oil field blacksmith, welding, machine, general repair shops and rental service stations on a large scale throughout active oil fields.

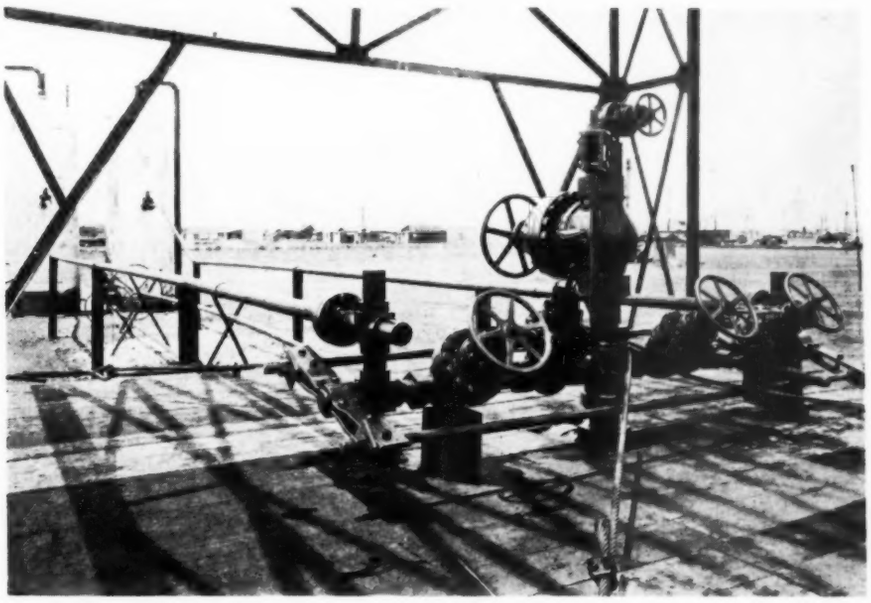
Largest individual manufacturer devoted to the manufacture of Drilling and Fishing Tools in the Mid-Continent oil and gas fields and one of the most modern plants in America.

Latest improved facilities for forging, boring, machining and heat treating, controlled by electric, automatic, pyrometer equipment, combined with chemical testing laboratories for scientific processing to insure maintenance of quality.

We offer the most complete and largest stocks of the latest type fishing tools for rent or sale, carried at all branches with cooperative practical service day and night.

HONEST TOOLS

When writing HINDERLITER TOOL CO. *please mention The Petroleum Engineer*



Hook-up on well, showing flow lines.

Use of Small Flow Lines Builds Back Pressure

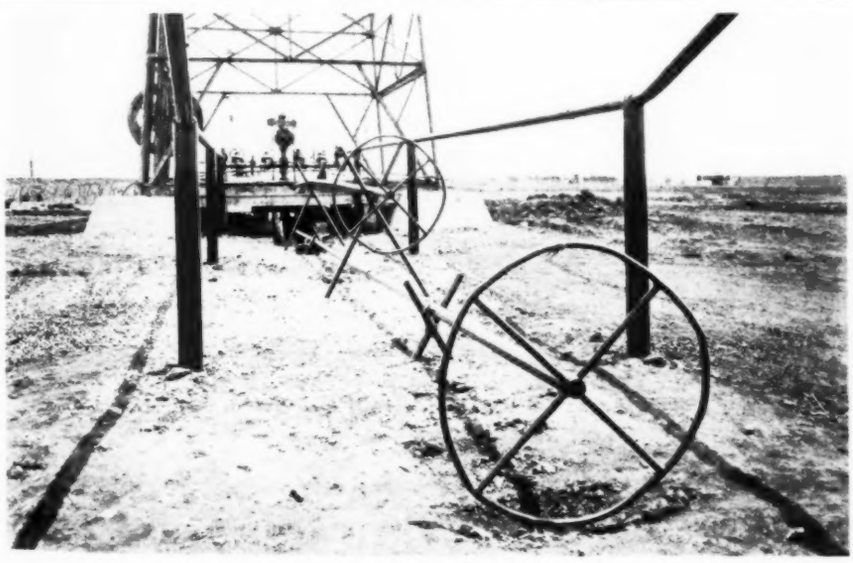
ESTABLISHING back pressure on flowing wells by the use of smaller flow lines has proven successful for the Continental Oil Company on its lease in the south edge of the Oklahoma City field. By creating back pressure in this manner it has curtailed the amount of sand flow from the producing wells, and aided in controlling more closely the gas-oil ratio.

In the Oklahoma City field the general practice has been to equip producers with six-inch flow lines. The Continental has adopted a standard practice of using four-inch flow lines. At this time several other operating companies in the pool are using four-inch flow lines and have found that the damage to connections from sand cuttings is reduced considerably.

The first Continental producer in the field was brought into production through four-inch flow lines a couple of months ago. Since this time all wells on the lease have been equipped with the smaller flow lines, states L. O. Hibbs, foreman. They have proven satisfactory on all the wells.

It is quite important that sand flow be reduced in some manner in the field, since a number of wells have cut out connections because of the great sand volume carried to the surface and through the connections at high velocity by the large production and high pressure.

Another important feature of the four-inch flow lines is that back pressure is placed on the well from the start and that it is present, without the necessity of extra hook-ups, at all times when the well is flowing. This restricts the production and never permits the well to produce its maximum gas production with the oil flow; thus the abrasive action on the connections is held in check.



Band wheels on control arms.

When first placed on production wells on the Continental lease are equipped with two separators, as is the practice in the field among operators. These are both connected to the well by two four-inch flow lines. When the well has settled off only one separator is maintained, the other being moved to some other location for service there.

The Continental wells are also equipped with the band-wheel system of closing and opening the master gate valves. This has now become almost general practice throughout the field. The control arms running outside of the derrick from the gates, for the purpose of closing and opening them without going on the derrick floor or in the cellar, are simply equipped with crude wheels that enable the crew to manipulate them quickly and in safety if the well is blowing.

CHROMIUM PLATED APPARATUS

for the

GAS INDUSTRY

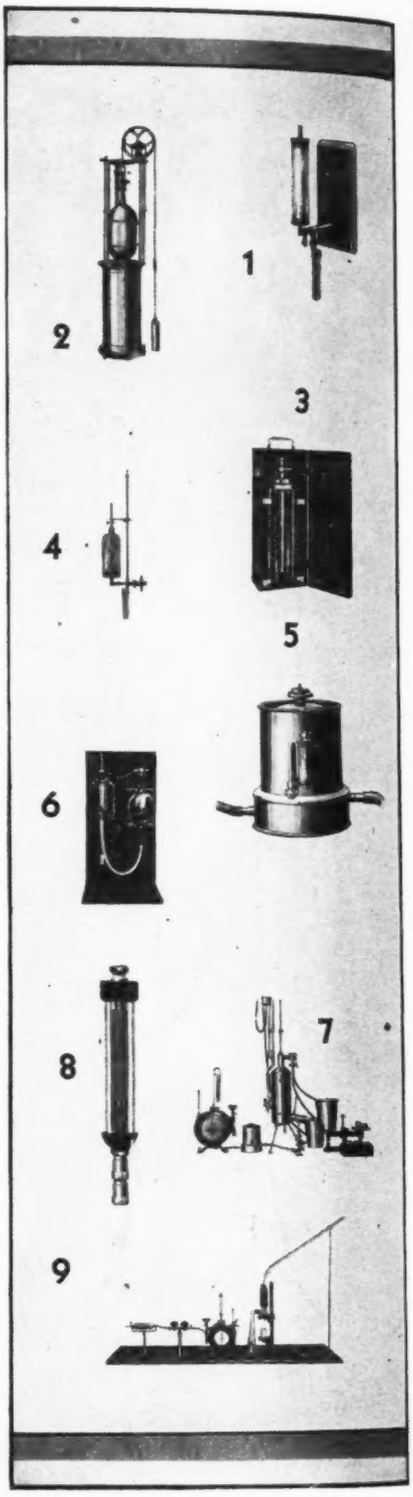
Chromium has proved its superiority over all types of plating that tarnish, stain, rust, corrode, wear or lose their lustre. Chromium plated equipment is now available to all users of gas apparatus.

Our protective plating is more than just a plate of chromium applied directly to the base metal. It is a triple plate first of copper, then nickel and lastly chromium. This produces a beautiful blue-white platinum-like color, the lustre of which is retained indefinitely.

Inert to sulphur and sulphur compounds, unaffected by atmospheric corrosion, chromium is the ideal plate and provides characteristics long desired by the consumer. Having longer wearing quality, and equal brilliance, chromium takes the place of nickel, silver, or platinum as a finish. No abrasives or polishing are required: simply wiping the surface with a damp cloth is all that is necessary to keep chromium plate bright.

Gas apparatus which may now be obtained in chromium plate is as follows:

1. Chimney Type Hydrogen Sulphide Test
2. Cubic Foot Bottle (Immersion Type)
3. Specific Gravity Apparatus
4. Young's Sulphur and Ammonia Test
5. Calorimeter Wet Governor
6. 1/10 Cubic Foot Bottle
7. American Calorimeter
8. Siphon Gauge
9. Referee's Sulphur and Ammonia Test



AMERICAN METER CO. MEASUREMENT ENGINEERS CUBIC FEET

AMERICAN METER COMPANY

Incorporated

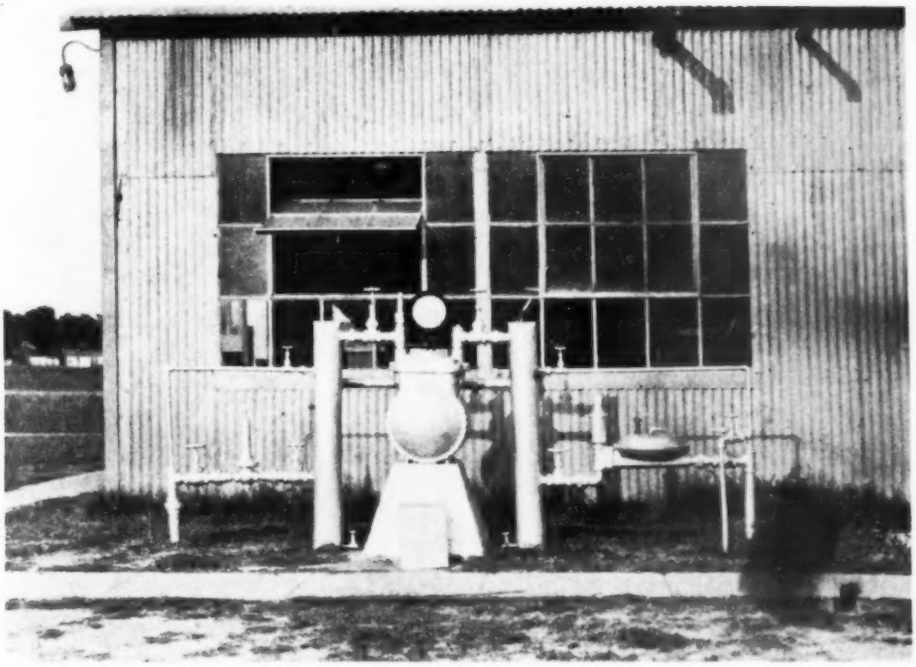
General Offices: 105 West 40th St., New York, New York

Established 1836

SALES ALBANY · BALTIMORE · BOSTON · CHICAGO · DALLAS · DENVER · ERIE · KANSAS CITY

SERVICE LOS ANGELES · NEW YORK · PHILADELPHIA · PITTSBURGH · SAN FRANCISCO · TULSA

When writing METRIC METAL WORKS OF AMERICAN METER CO., INC., *please mention The Petroleum Engineer*



Regulator and meter set up at gas engine driven station.

Operating Features of

Gas Engine Powered Pump Stations

FOR the reason that oil pipe lines are usually distantly located from natural gas transmission systems accounts for the rarity of gas engine powered oil pumping stations. In some areas crude oil transporters have found it practicable to install one or two stations using the most economical of fuels, natural gas, to burn in the engines. Consequently, such stations are in a position to show an exceptionally low fuel cost per thousand barrels of oil pumped. Such stations, of course, have less trouble arising from fuel troubles, units are easier to lubricate and kept cleaner.

A few years ago the Magnolia Pipe Line Co. built an 8-inch line from the Smackover, Ark., area to its refinery at Beaumont, Tex. A short time prior to that the Magnolia Gas Co., then an affiliated company, laid a natural gas transmission system from Northwest Louisiana to the Gulf Coast refinery. The oil line right-of-way out of Arkansas was tied into the gas line right-of-way when it reached Louisiana and the oil line paralleled the gas line on down to Beaumont.

This afforded the advantage of using natural gas for fuel at stations adjacent to the gas line and consequently the first oil line with gas engine driven pumps at several main line stations was built. Except for the stations on the northern end of the line, all of the stations are gas engine driven pumping plants. Eleven such stations with 150 and 165-horsepower gas engines driving three 5 by 18 reciprocating pumps per station were built. They were designed to pump from 20,000 to 23,000 barrels of 30 gravity crude during the summer months. Station practice is to operate two units and hold the third in reserve.

The cost of fuel gas at each station varied because the pumping cost of the gas increased as the gas line neared its terminal. An idea of the economy of this fuel, however, may be gained from an average fuel consumption of the several stations. Over a month's period the fuel consumption of each engine averaged 1,000 feet of gas per every 245 barrels of oil pumped.

Several of the engines had been in service and were overhauled before going on the line. After these had been adjusted and the new units broken in no unusual trouble was experienced with the power plants. Lubrication on some of the engines presented a problem, but this was solved satisfactorily by installing shop-made crankcase oil leveling devices. This overcome the tendency of some engineers to over-lubricate and likewise prevent serious trouble as the result of not enough lubrication.

The gas for station and station site consumption comes from a lateral line extending off of the high pressure line. The pressure is reduced with a regulator at the gas company's measuring station in the field. At the station and outside of the engine room is another fuel regulator and meter set up. Gas is measured through a meter with an automatic recording gauge and delivered to the 8-inch fuel header at around six ounces pressure. Before the gas goes through the meter it passes through a moisture knock-out and through another after passing through the meter. These are equipped with drain cocks in the bottom to draw off any accumulation that would otherwise find its way to the engines and possibly cause or accelerate trouble.

The meter is mounted on a concrete pedestal to make it rigid and as a safety measure the set-up has a pop valve

Safety First!

For safety, under high-pressure, high-temperature conditions, what comes to your mind first? STEEL AND WELDING, of course! Modern conditions demand modern equipment.

Steel pressure springs with welded connections are made by Foxboro—for safety first and *better results*. These new steel springs give the long desired protection and make an actually better Recording Gauge. They will *not fail* in case of fire. This makes steel springs indispensable on all inflammable fluids.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

For corrosion resistance, too, steel pressure springs fill a long felt want. Exposed surfaces are tinned and lacquered. Steel springs are the answer to production demands.

Another advantage! Heat treated steel has a high elastic limit. The movement of the steel tube is always within its elastic and fatigue limits which means permanent accuracy and long life. On high pressure steam they stand up much longer.

Foxboro Recording Gauges are made to stay accurate under rough service for many years. They are built and sold for performance.

For Safety First and Better Results use Foxboro Recording Gauges.

Write for Bulletin 168-K.

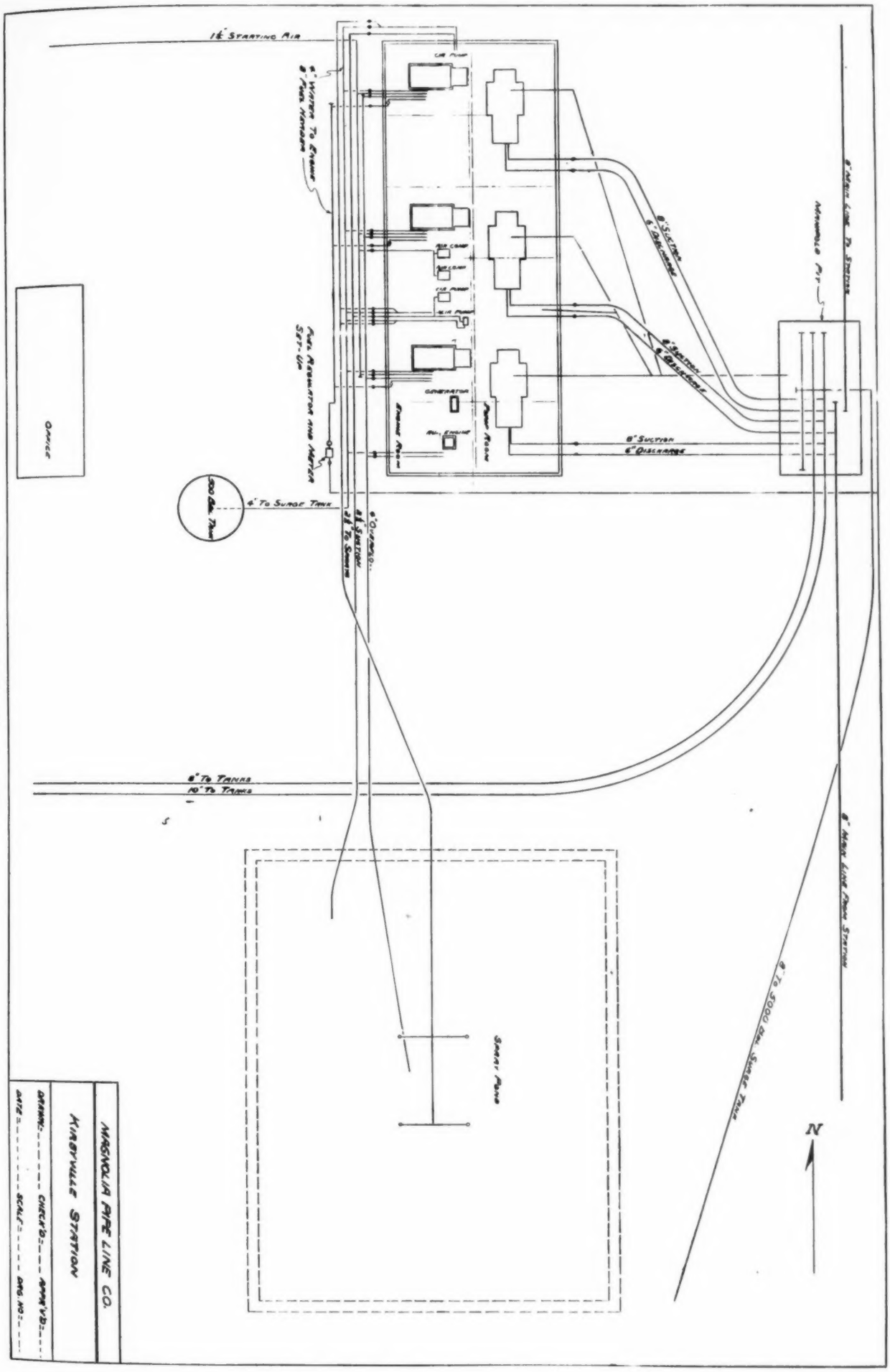
THE FOXBORO COMPANY
Neponset Avenue **Foxboro, Mass., U. S. A.**

BRANCH OFFICES:
New York, Chicago, Boston, Philadelphia, Detroit, Pittsburgh, Cleveland, Portland, Ore., Los Angeles, San Francisco, Salt Lake City, Atlanta, Tulsa, Dallas, Rochester, N. Y.

BRANCH OFFICES:
Canada: Peacock Brothers, Ltd., Montreal
Australia: Alfred Snashal, Ltd., Sydney and Melbourne
England: Walker-Crosweller & Co., London
P. I.: The Edw. J. Nell Co., Ltd., Manila

INSTRUMENTS *for* CONTROLLING, RECORDING *and* INDICATING TEMPERATURE, FLOW, HUMIDITY *and* PRESSURE

When writing THE FOXBORO CO. *please mention The Petroleum Engineer*



Layout of a Magnolia Pipe Line Co. station.

on it. The recording instrument is protected from the elements with a sheet-metal hood which may be locked in place, and the set-up is kept neatly painted with an aluminum coating.

Simplicity in design and layout is another of the features of each station. The station buildings are constructed with a steel frame work with sheet-metal sides and roofs. A fire wall separates the engine room from the pump room side and ample provision has been made for natural lighting. Aside from the three engines there is scarcely any other equipment in the engine room. All of the station piping is carried in the building through conduits. The accompanying station layout, typical of the stations on the line, graphically illustrates the simplicity in design.

Auxiliary equipment consists of 15-horsepower gas engine, operating at 350 r. p. m., driving a 120-volt generator. The smaller auxiliary equipment consists of two air compressors and circulating pumps. One of the compressors is motor driven and the other is driven by a small gas engine. Alongside the air compressors is a motor-driven circulating pump. Each motor-driven unit has a separate switch control panel adjacent to the motor.

On two of the units in some stations circulating pumps are driven with a belt on a pulley operating off the flywheels of the engines. The pulleys are attached to the flywheels with couplings and the pumps are mounted on concrete pedestals a few inches above the floor level. All of the flywheels are guarded with pipe railing bolted to the floor.

Excluding the station storage and working tank the only tankage on the site is a 500-barrel capacity water tank for the engine circulating water. Starting air is stored outside in two vertical cylinders. Circulating water is flowed from shallow water wells with gas which is later returned to the fuel line.

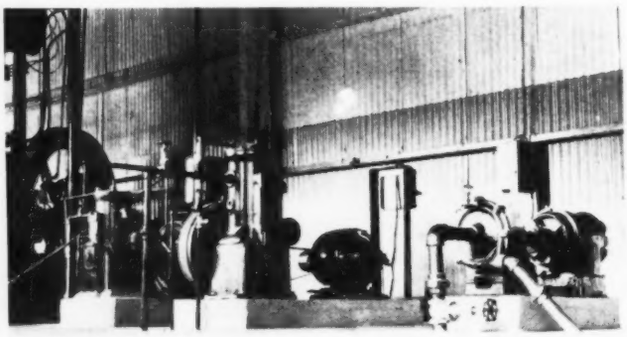
Water from the engines may overflow through a 4-inch line to the spray pond or may go through a 2½-inch line to the sprays. The 500-barrel tank is used as a surge tank to supply make-up water or care for excess.

Maintenance of the station and equipment is made easier in the engine room because each engine has an individual lubricating and filtering system. The filters are overhead in connection with the lube oil level control. With the level control only a predetermined level of oil stays in the crankcase, the excess drains into a pump suction which discharges the oil to the overhead gravity tank where it is filtered.

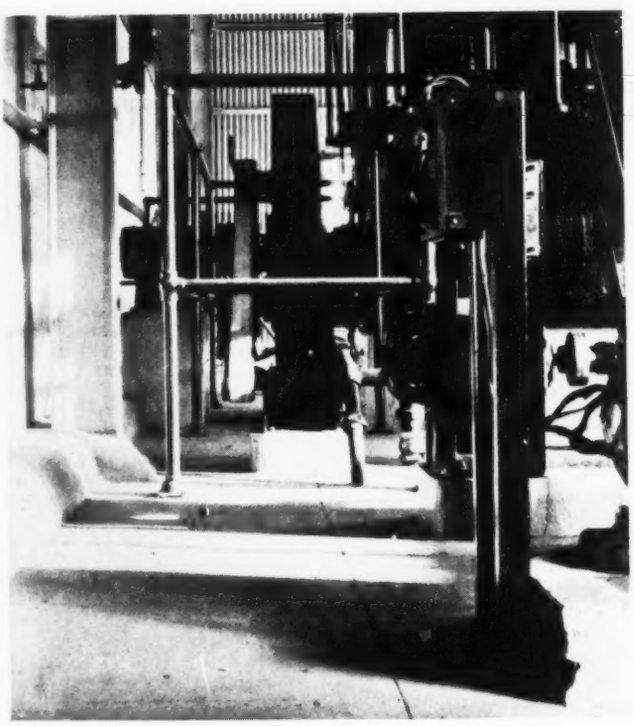
Inasmuch as there are no fuel oil lines to possibly leak oil on the floor, the station crews have little trouble in keeping the painted floors in good condition. The engines are kept free of lubrication leaks and are periodically inspected. Thus far the engine repairs have been for minor troubles. Instead of the exhaust pipes running to the outside of the building and then upward the design called for carrying the exhaust gases out through a pipe leading through the roof.

The pump room side of the station is likewise kept in a tidy state. All of the pumps were purchased new and each pump has a recording pressure gauge.

In addition to water lines the station fire fighting equipment consists of several hand-operated extinguishers and a portable foam engine. Small spare parts for the engines and pumps are stocked in a warehouse in connection with the station office where the telephone and telegraph instruments are housed.



Some auxiliary station equipment.



Circulating pump connected to engine fly wheel.

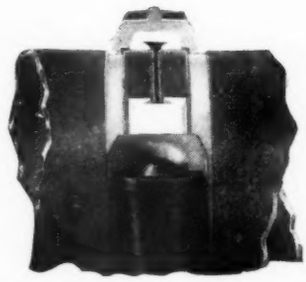
"For every joint on every line"

Pipe lines laid with Victaulic Couplings — conform to grade changes and curves — are leak-proof for the life of the pipe — are laid faster and with unskilled labor.

• • •

Available for steel, wrought iron, cast iron and spiral weld pipe — all sizes from ¾" up — for all working pressures. See Sweet's Page 451. Mail the coupon below.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York



"For every joint on every line"

FLEXIBLE LEAK-PROOF
VICTAULIC
REG. U. S. PAT. OFF.
PIPE COUPLINGS

VICTAULIC DISTRIBUTORS

Mid Continent and Rocky Mountains
HANLON-WATERS, INC.
Tulsa, Oklahoma

Pacific Coast
DUCOMMUN CORPORATION
Los Angeles and
San Francisco, California

Western Pennsylvania
PITTSBURGH SUPPLY COMPANY
Pittsburgh, Pennsylvania

Eastern Pennsylvania
R. J. CROZIER & CO.
Philadelphia, Pa.

Illinois, Indiana
BELL and GOSSETT
Chicago, Illinois

Ohio
CASE HARDENING SERVICE CO.
Cleveland, Ohio

Minnesota, Wisconsin, Iowa
F. S. VAN BERGEN
Minneapolis, Minnesota

Canada
D. B. McWILLIAMS
Toronto, Canada

West Virginia and Kentucky
THE McJUNKIN SUPPLY CO.
Charleston, West Virginia

Tennessee
TENN. MILL & MINE SUPPLY CO.
Knoxville, Tenn.

FOR OIL, GAS, WATER, SEWAGE, COMPRESSED AIR, ETC.

COUPON
For uses, installations, specifications and prices, fill in and mail this coupon.

VICTAULIC COMPANY OF AMERICA
26 Broadway New York
Please send me VICTAULIC BULLETIN No. 2

Name.....
Address.....

Compact Arrangement *of* Equipment Necessary *on* Small Town Lots *in* California

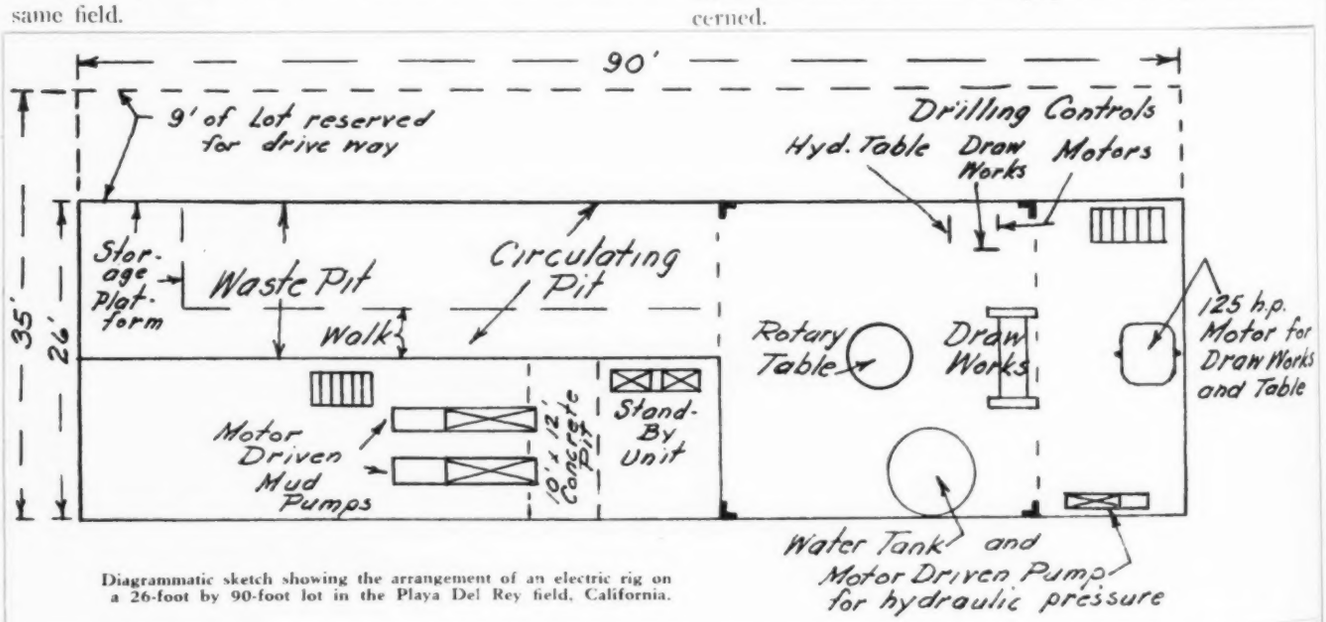
By **W. A. SAWDON,** *Petroleum Engineer*

WHILE town-lot drilling disregards any consideration of well-spacing, it is always faced with the problems of space conservation and fast drilling. The sizes of lots where such practice is in vogue naturally vary to a considerable extent, but it is seldom that they are less than 50 feet in width with considerably more than 100 feet in depth. In the new and very active Playa Del Rey field, however, the lots are of exceedingly small area, with the sizes near the ocean becoming so narrow that the derrick foundations can hardly be constructed within the property lines. An interesting example is of a well that has just been rigged up on Davis No. 2 for Knox, Powell & Stockton.

The lot on which this location was made has a frontage of 35 feet and a depth of 90 feet. A 9-foot strip, however, is reserved for a driveway, which makes the actual size of the lot 26 feet by 90 feet. In drilling a well on this lot the company decided to use an electric-driven Hydril rig, since boiler room could be saved by using electricity for power and since they had made exceptionally fast time with a similar installation in the same field.

Drilling on tide-land locations in California.

A diagrammatic sketch showing the approximate location of the various pieces of equipment is given in the accompanying drawing. The 125-H. P., variable speed, 900-R. P. M. motor is almost entirely below the derrick floor, since its shaft and all other drives of the rig are located below the floor. The two slush pumps are set in the belt house which was erected to be ready for pumping on the beam after the well is completed. These two slush pumps are each driven by 75-H. P. variable speed motors with V-belt drives. They are entirely below the floor and have their suction in a concrete pit at the forward end. A 40-H. P. induction motor with a V-belt drive is used for power on the pump furnishing the hydraulic pressure to the rotary table. All these motors are controlled by means of push buttons located for the driller's convenience at the hydraulic table controls and the drawworks brakes. The original design called for the installation of a 1,500-barrel tank on the back of the lot. It was later decided to leave this off, since it would interfere with a walk and a storage platform. There is, however, sufficient room for this tank as far as equipment arrangement is concerned.



Diagrammatic sketch showing the arrangement of an electric rig on a 26-foot by 90-foot lot in the Playa Del Rey field, California.

Importance of Gas-Lift Method for Deep Wells

THE difficulties that probably will be attached to attempts to pump the deep producers of the Oklahoma City field make the possible success of air and gas lift applications doubly important to the ultimate recovery of the pool. The employment of air and gas lift in the area is in a very early stage of development, and operators are carefully watching results obtained.

All of the wells so far placed on gas or air lift have been in the center of the field, where the producing horizon is the Arbuckle or siliceous lime. This area is being heavily intruded with water encroachment, which forces a column of fluid up in the hole, making the principal lifting problem one of carrying the water off the oil. For the most part wells in this district are making much more water than oil, with a few making practically all water.

Several companies are preparing to increase the gas lift facilities. Most important of these, perhaps, is the work of the Skelly Oil Company on the Hoopes lease in the south part of the pool. The producing horizon on the lease is the Detrital sand. These will be the first sand wells in Oklahoma City to be flowed by means of artificial pressure, hence the unusual importance and interest.

Thus far there has been but little water intrusion on the sand producing wells, except in the extreme edges of the producing area. It may be expected that where the pressures have declined greatly that the fluid column may be lower. High pressure due to water and lower fluid levels in oil wells usually gives much lower kick-off and working pressures. The success of the application of gas lift on these sand producers of 6400 feet will be important to every operator in the field.

The Indian Territory Illuminating Oil Company is another operator that has increased its gas lift facilities. This company now has eight plants, which are combination compression and absorption gasoline plants laid out to be used for gas lift. It has recently completed several of these plants.

The general practice in the field has been to place dead siliceous lime wells on gas lift. The flowing power has ordinarily been residue gas, but air has been used, and even direct gas pressure from another well has been employed.

A practice that has been more or less common in the field is that of elevating the separators. However, they have not been raised to heights that were commonly used in Seminole, as the usual installation will gravitate down to the tank battery with a very small head.

The per cent of water is the most important item as far as the amount of pressure is concerned; thus each well is practically an individual problem.

The submergence of the tubing has been from 2500 feet to 2500 feet. Due to the greater per cent of water ordinarily present when operators decide to set the tubing lower, these wells usually demand bigger pressures. The average kick-off pressure in tubing set at 2500 feet has been 450 pounds, and slightly higher, while the working pressures have been around 325 pounds. In tubing set at 3500 feet to meet the fluid level the average kick-off has been 1000 pounds and the working pressure from 800 to 850 pounds.

Most of the wells are flowed down the tubing and up casing. The practice has been to use 2½-inch external

A gas lift well.

Skelly Oil Co. Hoopes well being prepared for gas lift.

upset tubing where the hole is cased with 7-inch O. D. casing, and 2-inch tubing in 6⅝-inch hole. Two-inch insert tubing is used in wells completed with 4¾-inch O. D. casing. The insert type is run female and looking up so as to offer less collar resistance to the flow of the fluid up through the annular space.

A number of wells are averaging a production of 300 barrels of oil and 2300 barrels of water per day. Less than 1,500,000 cubic feet of gas is used daily, while the oil and gas ratio is about 620 cubic feet per barrel of fluid. While speaking of production, it is interesting that as much as 8000 barrels of fluid has been lifted in 24 hours through 6⅝-inch casing.

One well in the pool has been on air lift. Two-and-one-half-inch upset tubing has been set at 3500 feet. The average kick-off pressure is 1000 pounds and the average working pressure 850 pounds.

Another well in the field, which has 2-inch external upset tubing set at 3500 feet, is being flowed but four hours daily. During this time it is making 78 barrels, while consuming 1,200,000 cubic feet of dry gas. The kick-off pressure is around 1000 pounds and the working pressure 800 pounds.

High-pressure gas from a neighboring well is being used as the flowing power in a well that is making less than 100 barrels of oil and a lot of water each day. This well is tubed with 2½-inch external upset tubing to a depth of 6106 feet. It has a kick-off pressure of approximately 1000 pounds and a working pressure of 500 pounds.

Gas lift operations in the field have not become general enough to determine the success of the method as it applies to Oklahoma City. The increase in the amount of work of this nature that is planned should very shortly, however, give valuable data on the possibilities of applying artificial pressure on these deep producers.

When It Comes to Golf—Bill's a Good Pipe-Liner

IT is certain the anonymous individual who mailed the accompanying photos of the well-known William G. Van-Arsdale of Tulsa and Morris, Okla., Monroe, La., Birmingham, Ala., and Jackson, Miss., or anywhere else the Natural Gas Engineering Corp. may be building a gas line, is not attempting to prove Bill builds pipe lines as he plays golf, nor is he trying to infer his time could be better spent on the firing line or in a swamp. It is not a Chinese proverb, but a truism among the old-timers in pipe line construction work that only a gang pusher can't find time for recreation in a 26-hour day on a job that is wanted yesterday.

As a member of the Jackson, Miss., country club, Bill is doubly certain the Southern Natural Gas Co.'s line to Mobile is going forward ahead of its schedule. Although he was sent down into the south country to build a line, such a thing as shortage of pipe might prompt him to take up the game calculated to make him forget line problems, causing worry and wonder why he can't get his foot out of the bucket when he drives. In addition he is charged with more than the responsibility of building a good line. That intangible value called good will has to be looked after and failure to accept the famed hospitality of a southern gentleman is equivalent to bad form in golf. Besides, there may have been right-of-way trouble with a wealthy planter who suspected Bill of allegiance to the Republican party and partly responsible for Hoover prosperity. Hence, a game of golf with the planter and defeat for a Yank.

Regardless of the foregoing, it's not so much why Bill is playing golf, because anyone is entitled to try, but how? It can't be said the superintendent of construction for the company does not dress a good game because evidence of such is in the photo.

In all probability the former division superintendent for the Oklahoma Natural gave another consistent 100 golfer a good lacing. Consequently that anonymous individual snapped a photo of Bill finishing a swing on the wrong foot and then took another photo facing Bill to insure proper identification of a golfer who can finish his swing on the wrong foot and still beat another not so expert.

Maintaining *the* Quality *of* Lubricating Oil *in* Service

By JOHN M. McGREGOR

WHEN we read of feats performed by aviators or racing car drivers or marvel at the wonderful complexity of modern machinery in every branch of industry do we give sufficient credit to the petroleum producer, refiner and transporter? Think where we will, no matter in what type of machine, were it not for lubrication the wheels of progress would stop instantly.

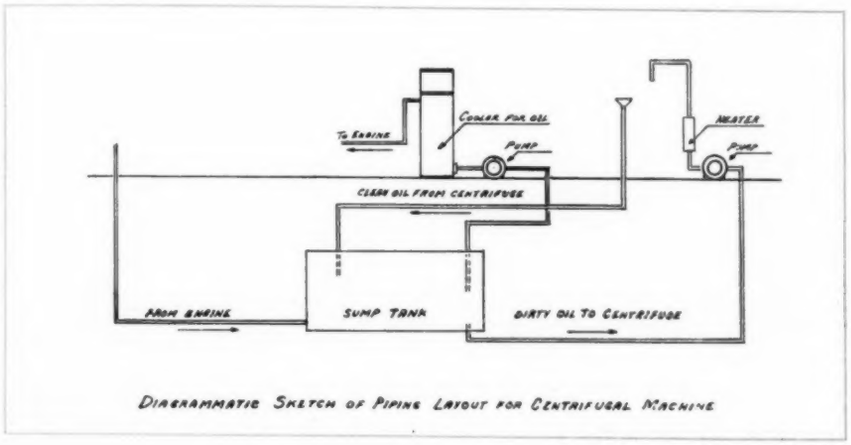
It is not too much to claim that it is oil that keeps the world, as we know it today, going, yet we are inclined to take everything in this direction, as in many others, for granted.

It is marvelous when we think of the changes that have taken place in the memory of living man. Could we have been anywhere near the position we are in at the present time had it not been for those pioneers in the oil industry and the others who have followed—always progressing? Comparatively speaking, a few years ago lubrication, as we know it today, was unknown, and little, if any, petroleum was used. Such oils as fish oil, whale oil, lard oil, etc., were the only lubricants known. Could any of the machines used throughout the world be operated were it not for modern methods of manufacture, for the research that is going on continually and, above all, for the wonderful progress that has been made in the science of oil refining?

Warships and ocean liners, aeroplanes and airships, automobiles of all kinds, mammoth machinery in the steel mill, in fact, every mechanical thing that has motion depends on oil. To the sorrow of many when driving the family car, it has been brought home very forcibly what oil, or the lack of it, means. A car, no matter how good it may be, will not travel very far without a good lubricant in its crankcase.

As with machinery, so with lubricating oil; if it does not get the proper attention it will soon deteriorate in service and will often become a menace instead of a valued helper.

It seems strange that in different phases of the oil industry itself one often meets with cases of negligence in the treatment of oil. One hears often that good oil is cheaper than machinery. This may be true although trite, but good oil does not remain good over a long period of time if it is not given the proper care and attention. The average man, whether he looks after machinery or not, appears to be lax about the treatment of his oil. It is not so very long ago that automobile manufacturers recognized the absolute necessity of cleaning the oil while in service and by so doing have saved the motoring public an incalculable sum of money. As with automobiles so it is with machinery in general and it is remarkable how inefficient are the methods adopted in many instances to take care of the lubricating oil in service, even in the petroleum industry itself. Whether it be in the field, in the compressor station, or in the pipe line station, there is every evidence that insufficient attention is paid to the question of lubrication by many companies.



DIAGRAMMATIC SKETCH OF PIPING LAYOUT FOR CENTRIFUGAL MACHINE

It may be that the cost of all lubricants runs around five to seven cents per 1,000 barrels pumped in a main line station, but this is by no means the end of the story. It is not so many years ago that the costs were in the vicinity of twice the sums quoted; but it is not alone the actual saving in oil bills that matters, even although this is a considerable item; it is the saving in time out for engine repairs due to bearing and other allied troubles. Such savings can hardly be estimated, and it has all come about through a better understanding of the application of lubricants and the methods of keeping them in good shape over a long period of time.

The methods that should be adopted to keep oil fit are varied, and the selection of a system would depend largely on the circumstances governing the installation. The three accepted methods might be classed as:

(a) Settling.
(b) Filtration.
(c) The use of the centrifugal machine.

(a) Except in small installations the first of the three methods mentioned might be ignored. To be at all successful the oil to be treated should be heated and left to stand for a considerable time to permit the difference in gravity of the oil and the impurities to separate, but even then real success is not obtainable. Most of the larger particles of dirt and some sludge will be precipitated out and any water in the oil will also be removed, but the fact remains that much of material that is foreign, and perhaps dangerous to the machinery, will remain. Should the oil contain emulsions, they will very likely not clean up, although some emulsions will break up by heating and settling, but in all probability the majority will still remain. It is, therefore, safe to state that with few exceptions, installations of any size should not consider merely settling their lubricating oil to clean it.

(b) There are many first-class filters on the market to-

day that can be recommended to do all that is asked of them. There is not much need to enter into a discussion of what a filter is or how it works, for the principle is the same in all of them; the passing of oil through some medium that will retain the deleterious matter and let the oil pass through cleaned. Naturally, the thinner the oil the easier it will pass through the filter, therefore, heating is resorted to in many instances. Unfortunately, however, some sludge materials are more readily dissolved in the oil when it is heated and consequently will pass through the filter, therefore, it is not always advisable to raise the temperature of the oil during the filtering process. Doubtless, the filter renders good service, but, naturally enough, has some limitations. For the complete removal of dirt and some sludges, the filter is first class, but in the majority of instances a combination of the filter and the centrifugal machine more nearly approaches the ideal, or where this is not possible, and particularly in large plants such as main line pumping stations or large compressor stations, the use of the centrifuge alone would appear to do all that is necessary, as it will very rapidly remove water, moisture and most other impurities, including most emulsions.

It might be well to study for a few minutes the systems in use for treating oil such as crankcase oil in a pumping station by means of the centrifugal machine. These might be placed under three headings:

(a) Continuous by-pass.
(b) Continuous treatment of all oil in the system.
(c) Batch method.

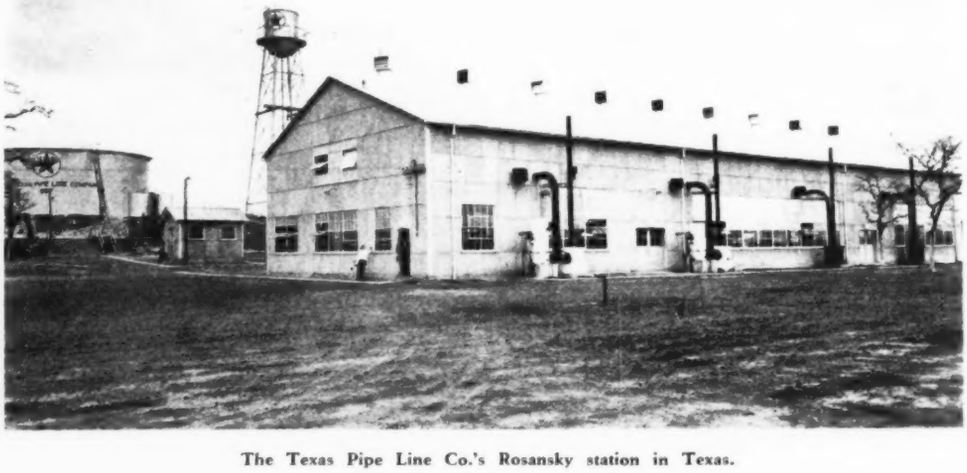
Although the second method would undoubtedly be the best way, the cost for the necessary installation would mitigate against its adoption in most cases with which we are dealing. Briefly, the system, as its name implies, consists of passing all the oil through the machine to be cleaned every time it has been used. This would mean quite an installation if it were to handle all the oil, say, for example, in a main line station.

A happy medium would be struck by the use of the continuous by-pass method. In this way a percentage of the total oil in the system is being treated all the time, the percentage varying with the way in which the plant is installed, but is usually in the vicinity of twenty per cent. The accompanying sketch shows what has been found to be a very successful method of handling the oil problem. There are two complete circuits and these can be readily traced on the sketch. The main circuit is that which starts at the engine crankcase (where more than one unit is in use the pipes from the different engines can be tied in together) and enters the bottom of the sump tank. From there a suction pipe, kept well above the bottom of the tank, carries the oil through a cooler back to the engine, the circulation being effected by means of a small centrifugal. The other, or subsidiary, circuit consists of a small centrifugal pump which lifts the oil from the bottom of the sump tank (thus taking care of the dirtiest portion of the lubricant) through a heater and into the centrifugal machine. The water, solid matter, etc., are expelled from the machine and are led away to the drain while the clean oil from the centrifuge passes by gravity back to the sump tank.

In making a comparison of the three methods of treating oil, that is, by the batch system, the continuous by-pass system and the complete system, it would be interesting to know what effect each has on the oil treated. Starting in every case with clean, fresh oil and using the batch method, the quality of the oil would deteriorate rapidly before cleaning. Removing it from the system, which would necessitate shutting down the machine, and thoroughly cleaning it, an oil almost as good as the original would be secured; however, immediately it was back in use impurities would be again picked up and would remain until the next time for cleaning, and consequently the machine would only be working under the best of conditions for very short periods. Ignoring the method whereby all the oil is treated after having been used once, for this method as has been explained already is rarely practicable, we find that the continuous by-pass method approaches very closely to the best that could be obtained under average circumstances. By using this method the oil would remain fit for service over long periods of time, and would show only a slight and gradual downward curve from the original quality.

By proper treatment the life of the oil, and the parts it takes care of, are greatly prolonged. It would be interesting to know just what amount of money can be saved by the installation of correct equipment to clean the oil in service and by studying the question of lubrication generally. However, enough experience has been garnered from several pipe line companies to state emphatically that although a very considerable saving that can be counted in dollars and cents can be made in the oil bill itself, a far greater sum, difficult to calculate, can be saved by minimizing repairs.

To be able to treat oil successfully, no matter which of the methods mentioned is used, correct lubrication cannot be hoped for if the right oil is not used in the first place. When cheap grades of oil are used it would probably pay to use the oil for short periods and replace it with new oil, as one cannot expect to make a good oil out of a cheap and inferior grade merely by filtering or centrifuging. Engineers and superintendents in charge of plants are more and more paying attention to the question of correct lubrication of the machinery for which they are responsible, and it is always advisable to start out with a good grade of oil, and, in large pipe line systems and other branches of the industry, it is safe to assert that it would pay a company to have a highly trained man to take control and all responsibility of the lubrication of all their plants.



The Texas Pipe Line Co.'s Rosansky station in Texas.

Vapor Phase Refining

is operating successfully in Direct Connection with Cross, Dubbs, Jenkins, and other Cracking Units—

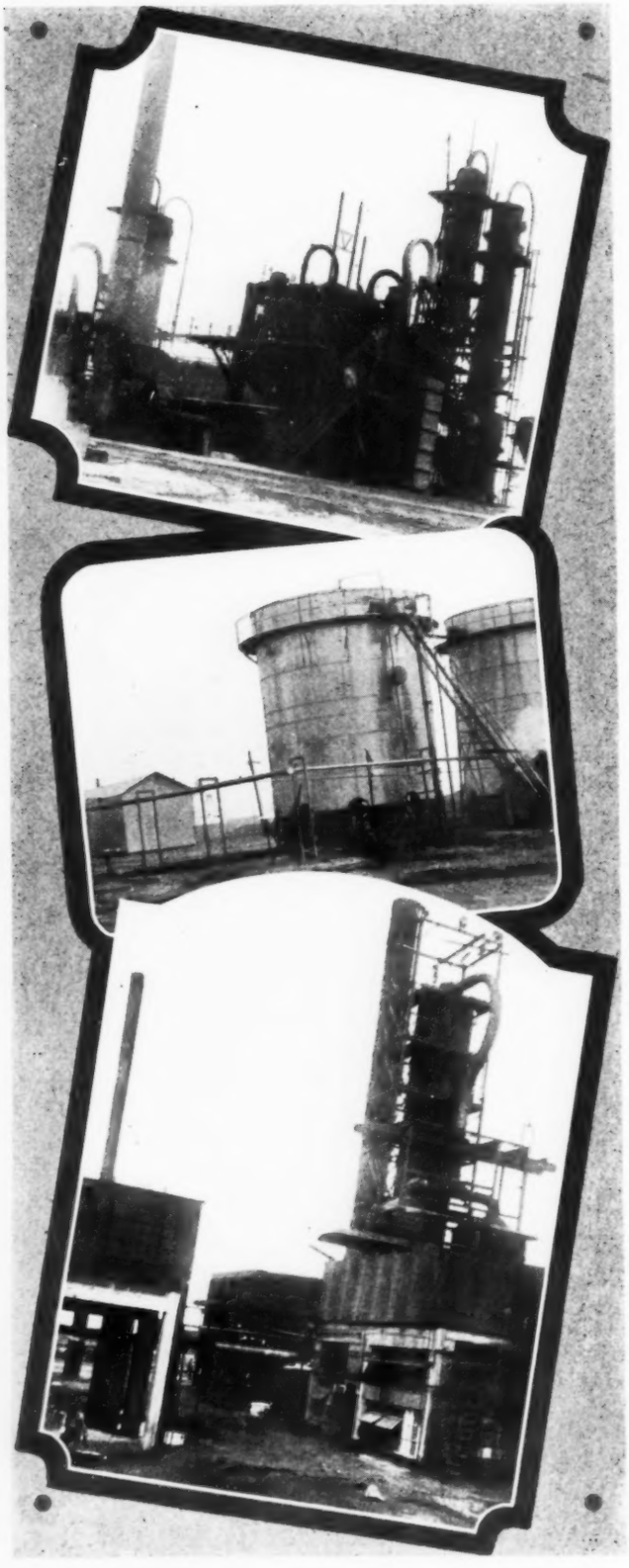
ELIMINATING ACID TREATING
AND RERUNNING

THE GRAY PROCESSES CORPORATION
961-975 FRELINGHUYSEN AVENUE
NEWARK, NEW JERSEY

When writing THE GRAY PROCESSES CORP. *please mention The Petroleum Engineer*

Handling Sulphur Crude *at* Richardson Plant

By **F. R. STALEY**



Three inside views of the Richardson refinery at Big Spring, Texas.

THE Richardson refinery at Big Spring, Texas, is processing 5000 barrels of crude daily from the Roberts and Henshaw pools in Howard County. The plant has recently completed its first year of successful operation. In order to refine this type of crude, containing both hydrogen sulphide and magnesium chloride, economically, it is necessary to combat the destructive forces of both corrosion and erosion, which are continually at work destroying equipment. The water supply also presented special treating problems. Under the direction of C. B. Faught, superintendent of the refinery, most of the operating problems have been solved and the refinery has been operating continuously.

In order to reduce corrosion in the units the practice in the plant is to add 0.25 pound of powdered lime to each barrel of crude oil charged to the pipe still. The lime is added continuously. Hourly gauges are taken on the lime mixing tank so that a controlled quantity is added. The use of lime lengthened the life of the equipment, especially that of the vapor lines.

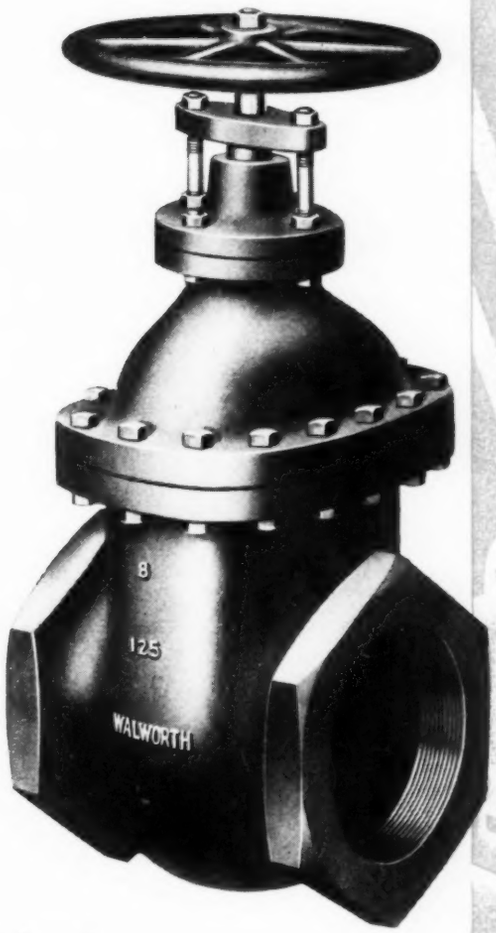
The crude oil is reduced in a pipe still, equipped with a fractionating tower, to 8-10 A. P. I. gravity asphalt. A straight run gasoline and a gas oil cut is made on the crude. Two of the latest type Jenkins units crack the gas oil. These units have a charging capacity of 2600 barrels, consisting of equal parts of gas oil and recycle stock. A cracked distillate of 410 degrees F. end point of 54 A. P. I. gravity is produced. The yield is about 60 per cent of the fresh feed.

The gasoline from the crude still condensers flows through two small tanks. Cold water is pumped into the vapor line as it enters the conden ers to dissolve hydrogen sulphide. The first tank collects most of this water and it is pumped back into the vapor line until spent. The second tank collects a small quantity of water carried over. Lime is added to the charging stock of the Jenkins cracking units, using one pound per barrel. A portion of the gas oil stream is run into the mixing tank each eight hours. The lime is added and agitated with air. This mix is pumped into the suction of the charging pump. The addition of lime has added many months of life to the equipment. During the entire period of operation none of the tubes in the pipe still or cracking unit has been replaced. The vapor lines of the crude still have not been replaced, but those on the cracking units required changing after

WALWORTH
STANDARD VALVES

CAREFUL WORKMANSHIP

assures dependable operation and service



Iron Body —Bronze Mounted or All Iron

125 lbs. Steam Working Pressure

"If Continental Sells It....There Is No Better"

THE CONTINENTAL SUPPLY COMPANY

General Offices: ST. LOUIS

THE CONTINENTAL SUPPLY CO., LTD.
224 Traders Building, Calgary, Alberta, Canada

Export Offices: CONTINENTAL EMSCO COMPANY, INC. 74 Trinity Pl. New York
London Offices: 316-17 Dashwood House, Old Broad St., E. C. 2

CONTINENTAL EMSCO S. A. R., 7, Strada Eminescu, Ploesti, Romania

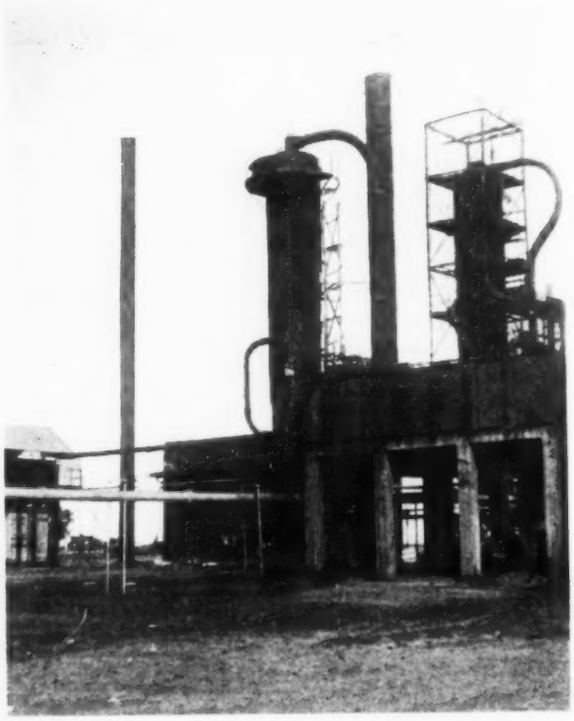
CONTINENTAL

When writing The Continental Supply Co. *please mention The Petroleum Engineer*

eight months. The residue from the cracking units contains quantities of coke and lime particles. The fuel is freed of these particles by passing it through cone-bottom settlers. Extreme care is required in drawing down accumulations from the settlers, and in cutting the still through the settlers after a clean-out, since an accumulation of water from steaming out, if allowed to enter the hot settlers, would cause a violent explosion.

The gasoline is batch treated in two 2000-barrel agitators. The straight run and the cracked gasoline are blended and treated with 93 per cent sulphuric acid, using eight pounds per barrel. It is then neutralized with caustic soda solution. The neutralized gasoline is rerun to 400 E. P. in a 2500-barrel pipe still. The distillate is then sweetened with doctor solution. The treated gasoline is stable to sunlight, has a low gum content, and the sulphur content does not exceed 0.1 per cent. The 400 end point gasoline has a 35 per cent benzol equivalent and a gravity of 60 A. P. I. The 375 end point gasoline has a 50 per cent benzol equivalent and a 64 A. P. I. gravity.

A satisfactory water supply for a refinery is a most important consideration in West Texas. The subsurface water at the refinery is suitable for condensing purposes, but the boiler feed water is pumped from wells a mile from the plant, drilled to another strata.

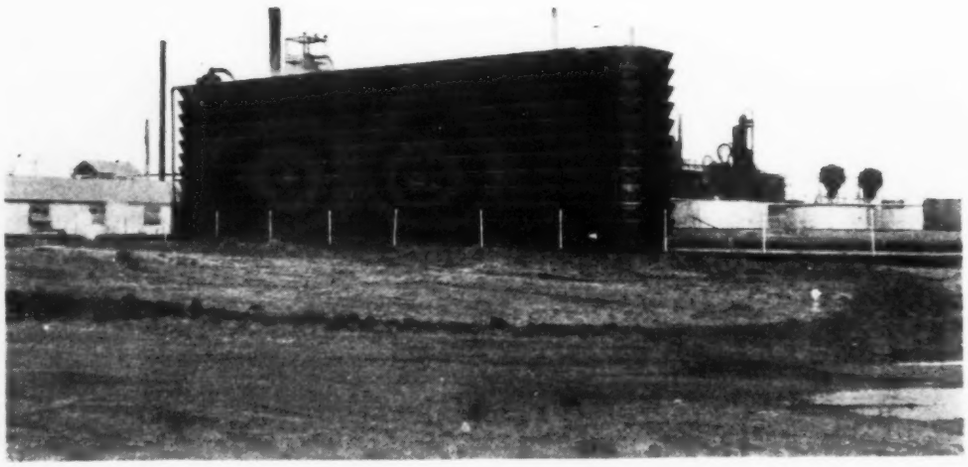


View of the yard and stills.

On account of the dry climate prevailing, ideal cooling conditions exist. Water from the condensers is cooled to 70 degrees F. A 2500-gallons-per-minute cooling tower with the new slotted type louvres was erected over a 30,000-gallon concrete basin. Circulating water is picked up in this small basin and pumped over the plant. The natural lay of the land permits the use of a concrete flume to return water from all the processing to a 1,000,000-gallon concrete basin. The flume was designed to handle 3500 gallons of water per minute. The water from the plant is spilled in one corner of the basin and picked up in the extreme corner by the cooling tower pumps. This gives a natural cooling of 10 degrees.

The plant was designed to utilize electric power wherever possible. Steam standby pumps are installed in case of power failure.

Although a satisfactory method for refining the crude has been worked out, the superintendent is not entirely satisfied with the results, and the research laboratory is continually working on methods to improve the products and to combat the destructive forces of erosion and corrosion peculiar to this type of crude.



Cooling tower at the Richardson plant.

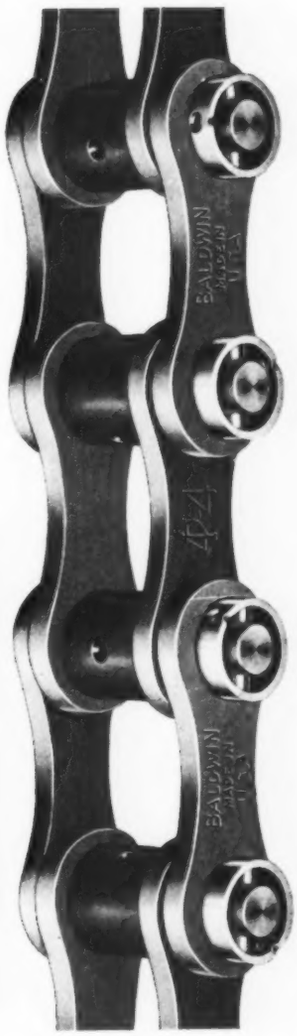
BALDWIN CHAIN helped make scenes like this

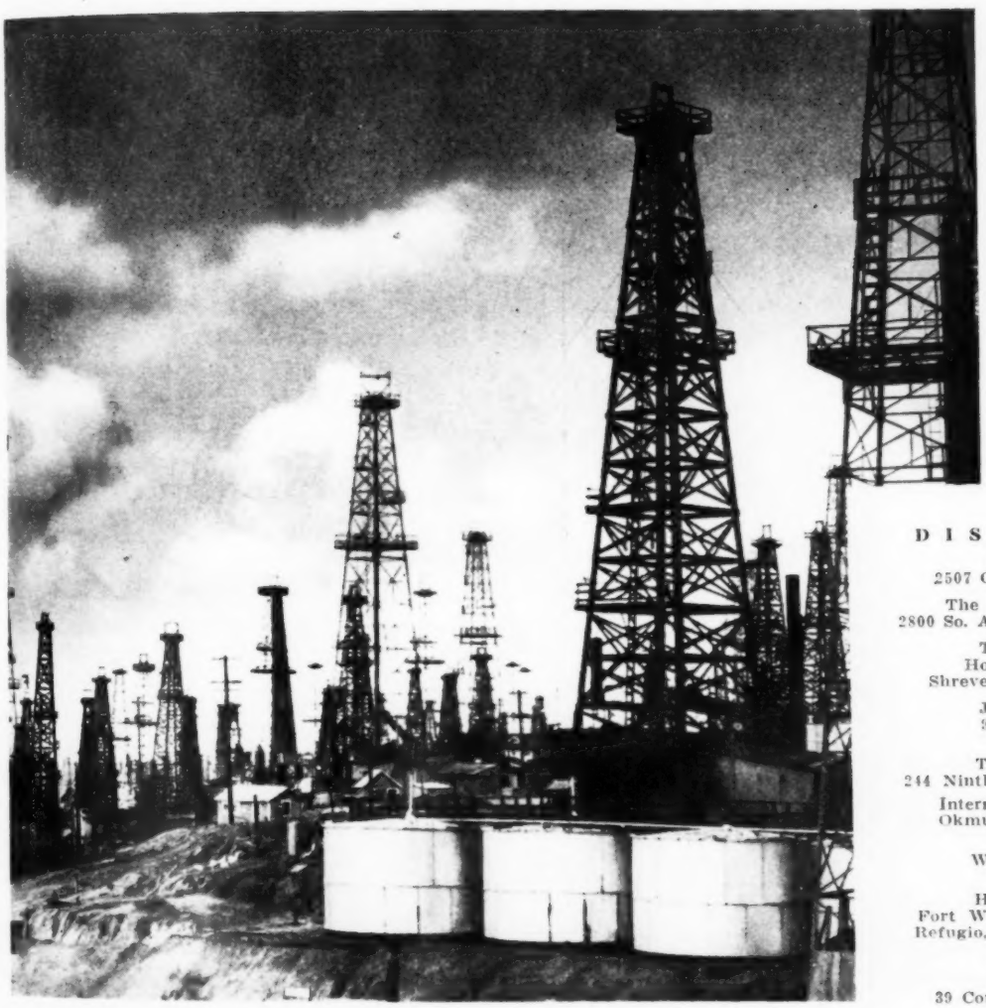
Baldwin Chain leaped to instant popularity when Baldwin originated and introduced its famous straight side bar *precision oil well* chain.

The straight side bar construction puts wear where it belongs—on the bushings and pins, resulting in a minimum of elongation. Baldwin *Precision* Chain pins and bushings are ground to exact size after hardening, which also helps to keep pitch elongation, the bug-bear of every driller, at a minimum.

And now Baldwin's new *Deep Well Super Service Chain*, with its cup pin locking device and superior pin design, represents another forward step. Ask your distributor for Bulletin No. 37 which describes this new Baldwin Chain.

BALDWIN-DUCKWORTH CHAIN CORPORATION
Baldwin Division
WORCESTER - - - - MASSACHUSETTS





DISTRIBUTORS:

Geo. J. Fix Company
2507 Commerce St., Dallas, Texas

The Petroleum Equipment Co.
2800 So. Alameda St., Los Angeles, Calif.

T. T. Word Supply Co.
Houston, Beaumont, Texas;
Shreveport and Lake Charles, La.

J. W. Minder Company
927-929 Santa Fe Ave.,
Los Angeles, Calif.

The Adam-Hill Company
244 Ninth Street, San Francisco, Calif.

International Supply Co. at Tulsa,
Okmulgee, Wewoka and Stroud

Grover C. Johnson
Wichita Falls, Pyote and
Big Springs, Texas

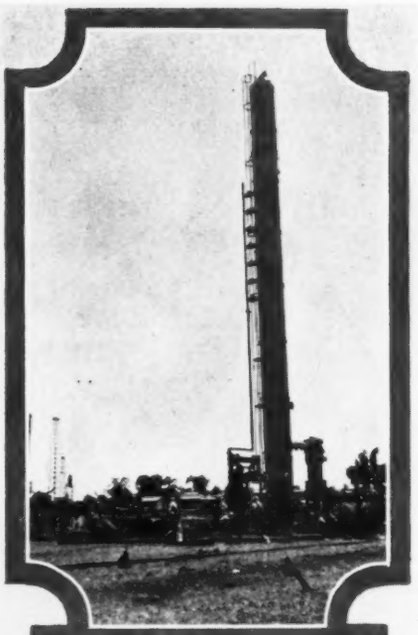
Hercules Supply Company
Fort Worth, Texas Pettus, Texas
Refugio, Texas Hobbs, New Mexico

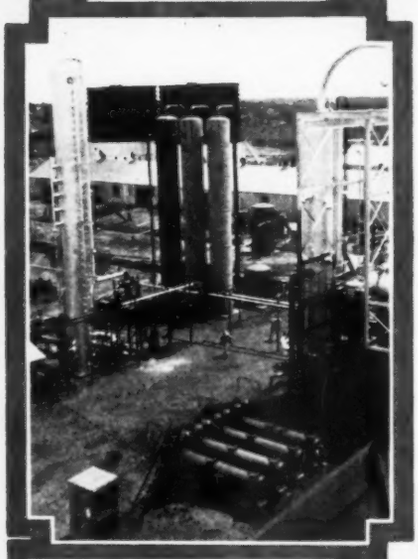
Export Department:
W. S. Fellows
39 Cortlandt St., New York City

BALDWIN DUCKWORTH

When writing BALDWIN-DUCKWORTH CHAIN CORPORATION *please mention The Petroleum Engineer*

Seminole Plant Installs NEW STABILIZING UNIT





THE Perry gasoline plant of the Carter Oil Company is the latest one built in the Seminole field by this company. Modern and efficient equipment was selected for the plant. The plant was built under the direction of George E. Edgett, general superintendent of the gasoline department, and George A. Shaner, assistant general superintendent. P. F. Michael is the construction superintendent and A. E. Perry, district superintendent, is in direct charge of operations.

It has a capacity of 27,000,000 cubic feet of gas per day, which is handled by three absorbers operated under a pressure of 40 pounds per square inch. They are five feet in diameter and contain 21 bubble trays each. The average gasoline content of the gas is three gallons per 1000 cubic feet.

The gasoline is slightly sour, and is treated with sodium hypochlorite solution to pass the doctor and corrosion tests. It is treated in a continuous closed system.

All of the gasoline is stabilized to grade AA. The plant has two stabilizer installations. The second one is nearing completion. These units operate under a pressure of 200 to 220 pounds per square inch. The first one has a capacity of 60,000 gallons per day. It is 48 inches in diameter and 33 feet high. The second one has a capacity of 100,000 gallons per day and is 48 inches in diameter and 73 feet high. Each tower contains 33 bubble cap trays.

The residue gas is compressed to 250 pounds. It is used in the field to flow wells or pumped into the fuel lines. The compression plant consists of 20 200-horsepower gas engine units. There is one separate motor-driven compressor used for kick-off purposes.

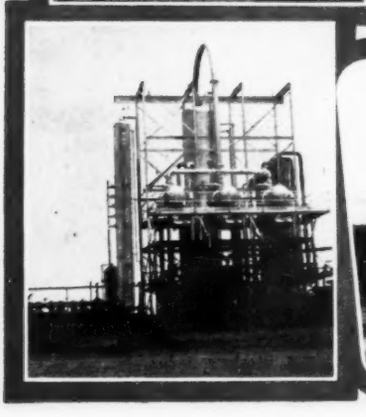
The plant has a storage capacity for finished gasoline of 175,000 gallons, consisting of 14 horizontal cylindrical tanks.

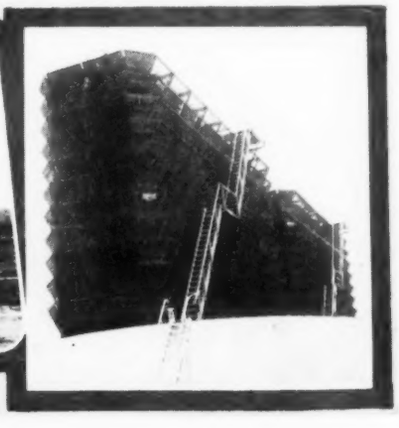
Electrical power for the plant is generated by four 175-KW units, each driven with a 250-horsepower gas engine.

River water is used. The boiler feed water is given a chemical treatment at the source of supply. Steam is generated by three 180-horsepower water tubular boilers.

A modern laboratory for testing the products and checking plant operation is an important feature.

The plant was designed and equipped by C. F. Braun & Co., Alhambra, Calif.

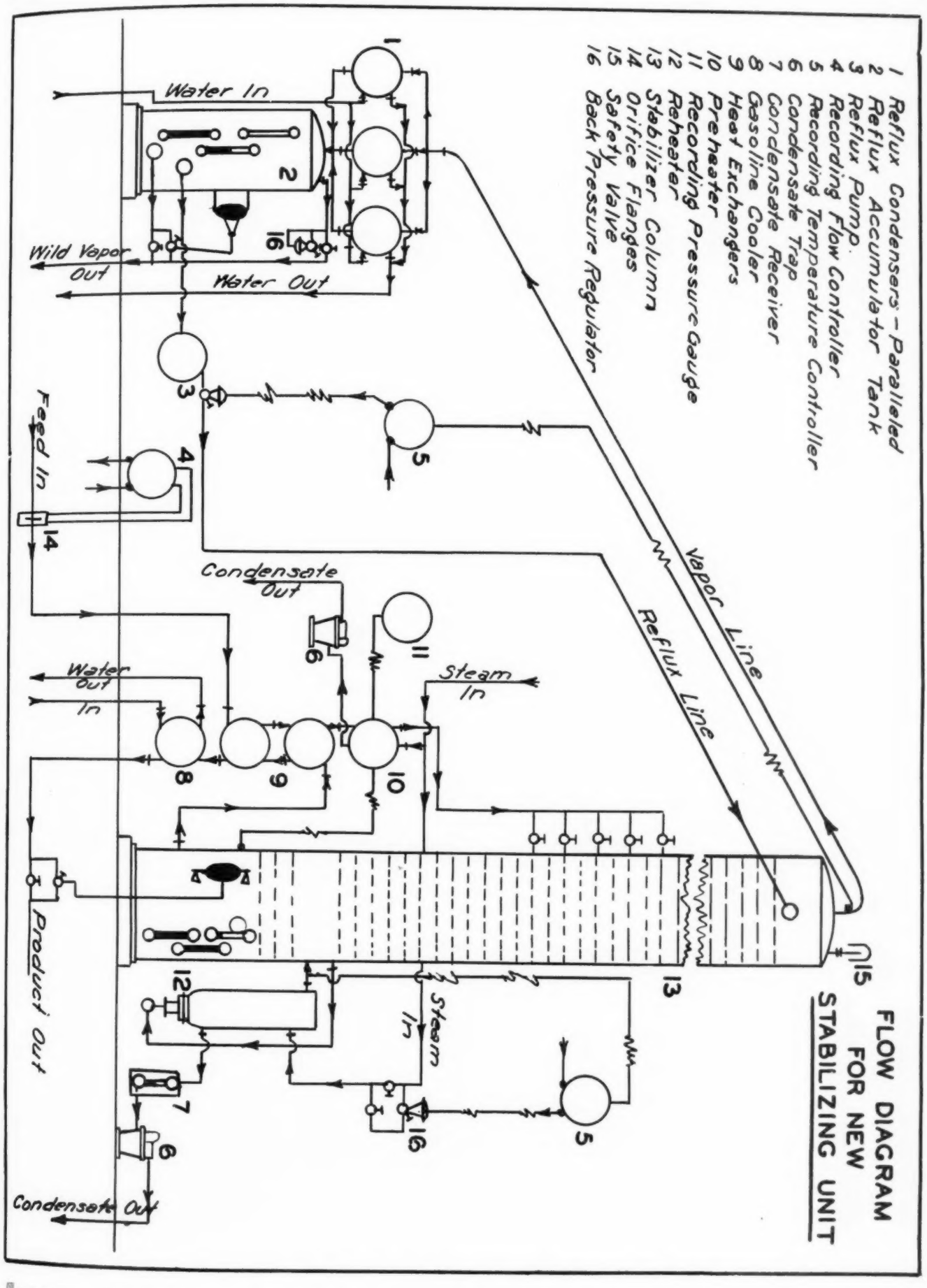




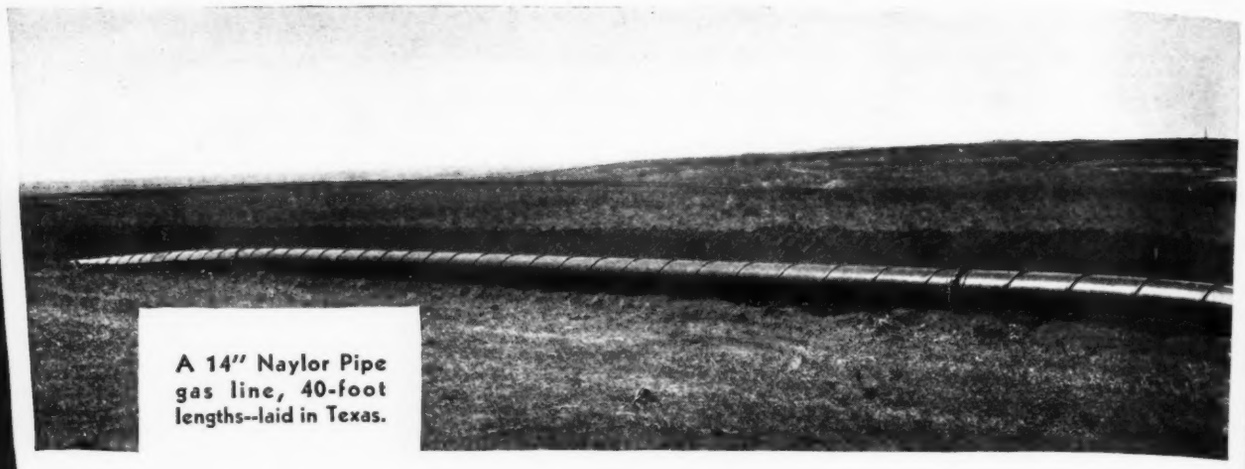
Top to bottom — New stabilizer. Absorbers and heat exchangers. Distillation unit.

Boiler house and power plant.

Cooling tower.



FLOW DIAGRAM FOR NEW STABILIZING UNIT



A 14" Naylor Pipe gas line, 40-foot lengths--laid in Texas.

Naylor Pipe

...Why it is the outstanding pipe for oil, water and gas

NO other pipe has the exclusive STRUCTURE which gives Naylor Pipe its dependability and adaptability.

Naylor Pipe is made with an *electrically welded* spiral lock-seam truss, a construction which provides *maximum structural strength . . . minimum weight . . .* and *automatic expansion and contraction throughout each joint*

Because of this construction...Naylor Pipe is a structurally strong and dependable pressure pipe ...yet it is 50% lighter in weight than standard weight wrought pipe. Light weight pipe, since it is easy to transport and to handle in difficult places, lowers your haulage, unloading, stringing, coupling and laying costs.

Because of this construction...Naylor Pipe requires no expansion joints of any kind. The spiral lock-seam truss acts as a continuous expansion joint, automatically relieving the stresses and strains ordinarily set up by changes in temperature.

Moreover, Naylor Pipe is made of Toncan Iron which is extremely resistant to rust and corrosion. Consequently, Naylor Pipe has greater life. Longer pipe life means fewer pipe renewals... lower maintenance cost. (The Toncan Iron used in Naylor Pipe is acid pickled to remove all Mill scale, thus avoiding galvanic corrosion often caused by this scale.)

On your oil, water and gas lines, use the most outstanding oil country pipe...USE Naylor Pipe.

NAYLOR PIPE COMPANY, Main Office & Plant, 1230 E. 92nd St., CHICAGO

SALES OFFICES

3116 Chrysler Bldg. New York ◆ Witherspoon Bldg. Philadelphia ◆ 507 Philtower Bldg. Tulsa ◆ 2301 Commerce St. Houston ◆ 402 Petroleum Bldg. Ft. Worth

MONTREAL, CANADA: Mechanical Equipment Company, 660 St. Catherine St., West

CHAMPION & BARBER, Inc.
506 Subway Terminal Building
Los Angeles, California
Exclusive Distributors:
California, Nevada & Arizona

TONCAN COPPER

Naylor Pipe

Maximum Structural Strength — Mo-lyb-den-um IRON — With Minimum Weight

Standardized Naylor Pipe is made in sizes 6" to 12" I. D. and 14" to 20" O. D. in any uniform length desired up to 40'0". Ends made to wrought pipe standards for all types of coupling.

Toncan Copper Molybdenum Iron possesses a superior corrosion resistance making it the favored pipe material.

Where corrosion is not a problem, Naylor Pipe can be furnished in steel.

When writing NAYLOR PIPE CO. *please mention The Petroleum Engineer*

Determining the Butane Content *of* Gas Mixtures

By A. E. KROGH[1]

THE past year has seen great development in the utilization of butane gas as a fuel. The recovery of this butane presents an industry in itself. There has also been considerable work done in the development of processes for the separation of butane and the lighter hydrocarbons from the heavier constituents of gasoline in order to reduce evaporation losses during gasoline storage.

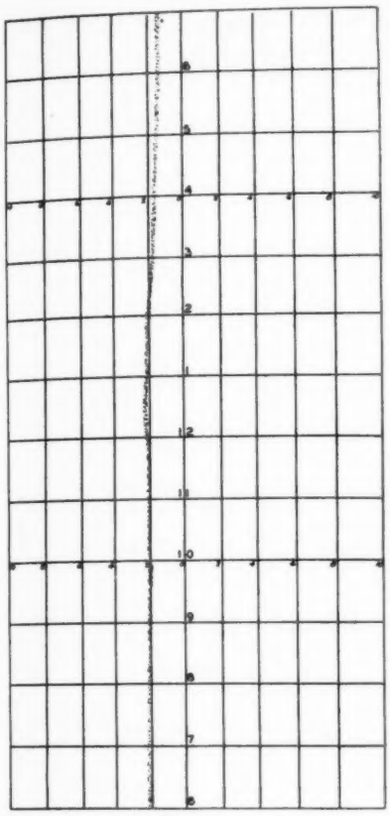


Fig. 1

This type of work necessarily involves frequent analysis of the gas mixtures involved, in order to determine not only the most efficient operating range, but also to determine how close the commercial operation remains within the specified limits once they have been set. Such analysis by chemical means involves a highly tedious procedure and becomes much too expensive for use in connection with commercial processes. Automatic analysis of gases by means of a thermal conductivity cell such as is used for analysis of flue gases may be employed when the mixture consists only, or chiefly, of butane and air, but when other hydrocarbons such as propane, methane, etc., enter the mixture, the thermal conductivity method introduces errors so large as to make the method useless. Recent field work has developed an entirely different method for the automatic analysis of gases which employs combustion of the gases as its operating principle. A continuous sample of the gas mixture to be analyzed is burned by a special type of Bunsen burner which is mounted in a suitable shield to protect the flame against air disturbances. Thermocouples rigidly mounted in the flame of the Bunsen burner measure the temperatures at various points in the flame and temperature differences are recorded on a single-record millivoltmeter similar to the well-known Brown pyrometer.

The theory underlying the operation of this equipment is that the rate of flame propagation (i. e., the rate at which flame will travel in a gas mixture of a given combination) is responsive to small changes in gas composition. The rate at which flame will be propagated in a gas mixture containing butane is greatest for a very low butane content and then decreases rapidly as the butane increases.

The study of flame propagation has received considerable attention in English laboratories, as well as in this country, during the past few years, and as the study progresses it becomes more and more evident that much remains to be learned regarding the phenomenon. It is known, however, that for a given gas mixture, i. e., a mixture of given constituents, a change in any one will produce a corresponding change in the rate of flame propagation. Some gases, however, have a great deal more effect than others, and butane happens to be one of the most active along this line.

Figure 1 shows a sample chart illustrating a record of butane-air mixture as recorded on the flame propagation analyzer. It will be noted that the rate of flame propagation was very uniform showing only a slight drop at about one o'clock with a gradual rise occurring thereafter. The gas on which this record was obtained contained approximately 17 per cent butane.

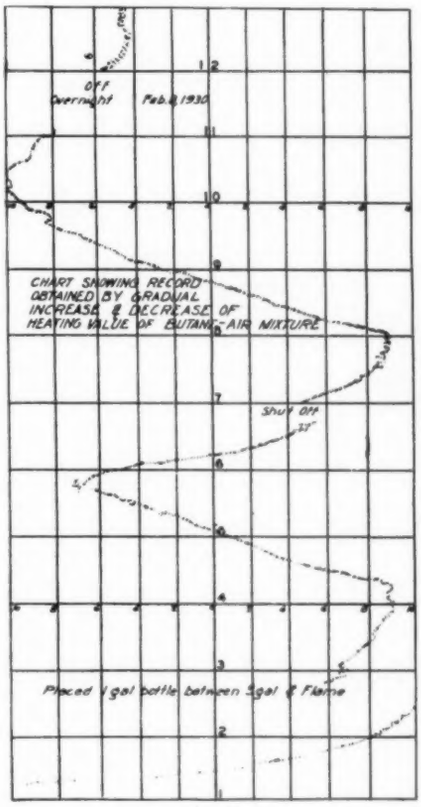


CHART SHOWING RECORD OBTAINED BY GRADUAL INCREASE & DECREASE OF HEATING VALUE OF BUTANE-AIR MIXTURE
Shut Off
Placed 1 gal bottle between Sgal & Flame

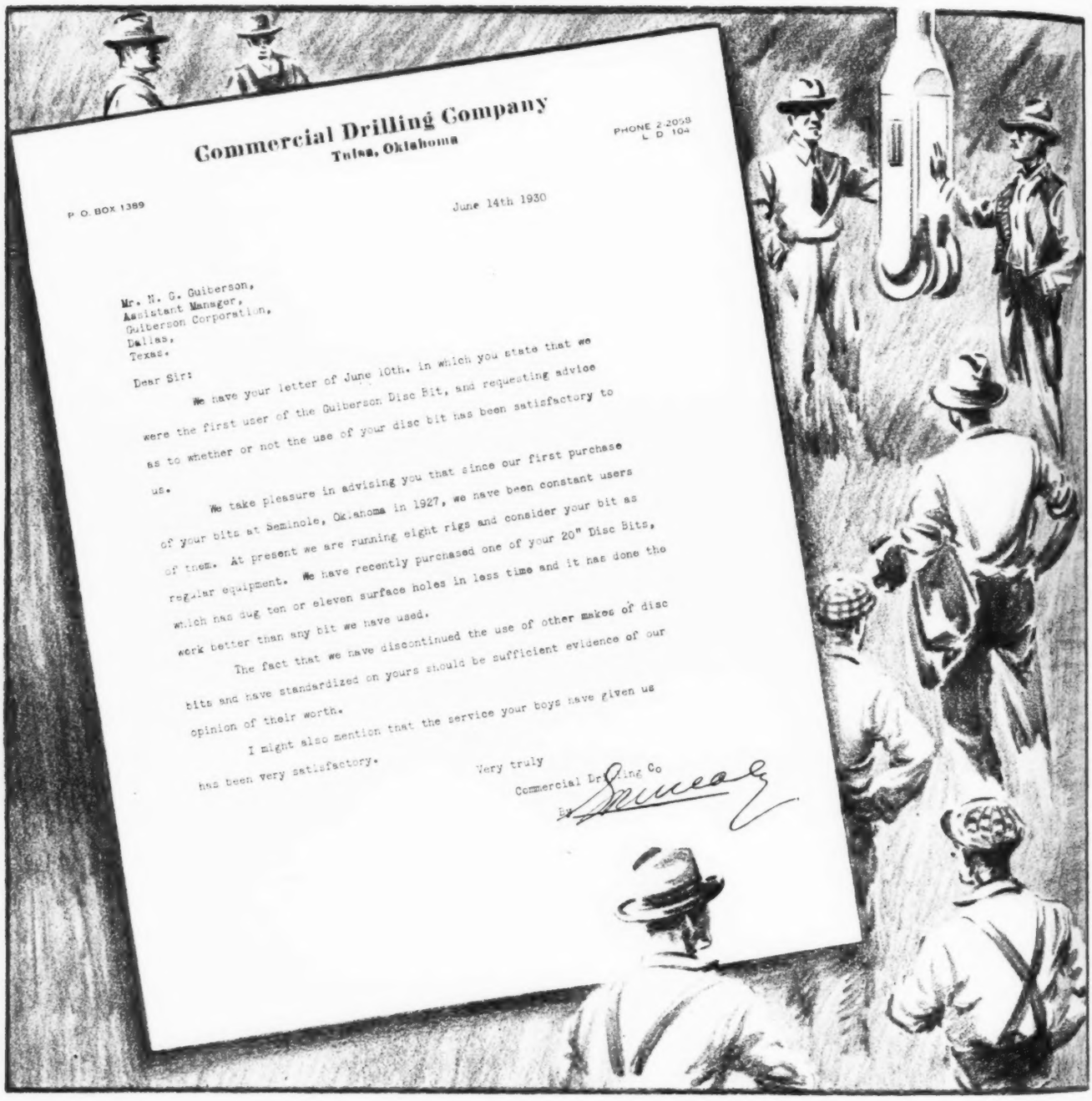
Fig. 2

Figure 2 shows a sample record illustrating the type of record secured by a gradual increase and decrease of butane content in the mixture. The range of the particular chart shown was approximately 12 to 22 per cent butane.

The analyzer equipment can be very easily applied to the automatic control of various processes. The combination of Brown trend analyzing control equipment with the flame propagation analyzer makes it possible to control to a very fine degree. By this means very gradual adjustments can be made to a valve or to the setting of a pressure regulator in order to obtain slight adjustments in the butane content of the gas. As the butane content decreases a slight increasing adjustment is made to the valve and the instrument then delays action in order to permit the effect of this adjustment to be felt before making further adjustments. Similarly a backing-off effect is secured as the butane content rises to the control point.

[1]The Engineering Development Department, The Brown Instrument Co.

The FIRST USER *discontinued all others*

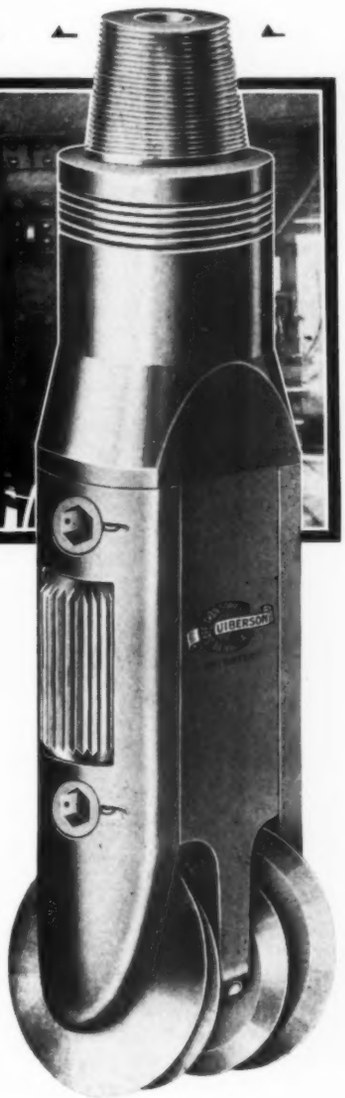

Commercial Drilling Company
Tulsa, Oklahoma
PHONE 2-2058
L D 104
P O. BOX 1389
June 14th 1930
Mr. H. G. Guiberson,
Assistant Manager,
Guiberson Corporation,
Dallas,
Texas.
Dear Sir:
We have your letter of June 10th. in which you state that we were the first user of the Guiberson Disc Bit, and requesting advice as to whether or not the use of your disc bit has been satisfactory to us.
We take pleasure in advising you that since our first purchase of your bits at Seminole, Oklahoma in 1927, we have been constant users of them. At present we are running eight rigs and consider your bit as regular equipment. We have recently purchased one of your 20" Disc Bits, which has dug ten or eleven surface holes in less time and it has done the work better than any bit we have used.
The fact that we have discontinued the use of other makes of disc bits and have standardized on yours should be sufficient evidence of our opinion of their worth.
I might also mention that the service your boys have given us has been very satisfactory.
Very truly
Commercial Drilling Co
By

GUIBERSON

BETTER BE SAFE THAN SORRY

When writing The Guiberson Corp. *please mention The Petroleum Engineer*

..(Seminole 1927)..
in favor of the GUIBERSON DISC BIT. . . . .



THE COMMERCIAL DRILLING COMPANY, OF TULSA, headed by Sol Mealy, has operated in Oklahoma for many years and was busy at Seminole during the big play. It was here, in 1927, on one of Mealy's rigs, that the Guiberson Four Disc Reaming Rotary Bit made its bow to oildom. Sol tried it because he liked its looks. Four discs looked better than two. The reamers in the side plates had a rugged, promising appearance. Other features of construction appealed to him, so he ran the bit and was rewarded by faster, straighter hole, reamed full gauge, than he had ever drilled before. He discovered that the Guiberson Disc Bit cut drilling time in half, drilled a straight hole down to fractions of inches and, although not intended as a hard rock bit, cut through intervening rock shells without the necessity of pulling out to change bits. What he thought of the bit after he had used it is best illustrated in his letter where he says ". . . we have discontinued the use of other makes of bits and have standardized on yours. . . ."

In the Oklahoma City field today we find Sol Mealy on the job with one of his eight strings on which Guiberson Disc Bits are standard equipment. From left to right the men in the picture are: Nick Young, F. J. Conway, Joe Chandler, A. E. (Speedy) Wilcox, Driller; C. E. Hipps, W. W. Gardner, Drilling Superintendent; Sol O. Mealy and Ben W. Roberts, Guiberson Salesman.

"Better Be Safe Than Sorry"

THE GUIBERSON CORP.
Box 1106, Dallas, Texas
California Branch:
1506 Santa Fe Ave., Los Angeles
621 Kennedy Bldg., Tulsa
506 Trust Bldg. Newark, O.
321 S. Osage St., Ponca City

When writing The Guiberson Corp. *please mention The Petroleum Engineer*

Indicator Cards to Find Valve Troubles

VALVE troubles such as leaking suction or discharge valves or valves with springs which are too stiff are frequently a source of much trouble on compressors in gas compressing stations and consequently cause a loss of efficiency that many times perceptibly raises the operating and maintenance cost of the stations.

With the aid of the indicator card, used frequently, and

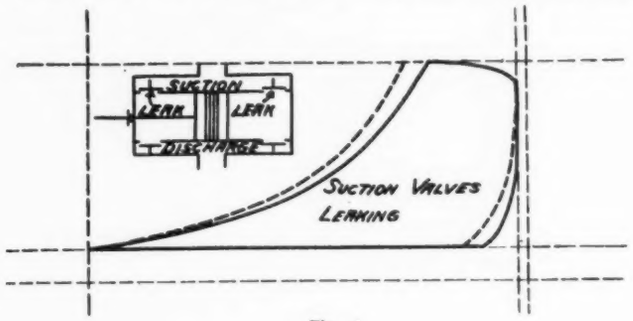


Fig. 1

a close analyzation or study of the card will result in better efficiencies and lowered operating costs. In the following are some examples of the troubles caused by inefficiently operating valves.

Suction Valves Leaking

In figure 1 is shown a card from a cylinder in which the suction valves are leaking. It will be observed that the suction line is normal in this case, which indicates that the piston rings are in good condition.

The compression line falls below that of a "perfect" card as in the case of leaking piston rings — the reason being that as the pressure rises in the cylinder, some of the gas leaks past the suction valves and decreases the total weight of gas being compressed. In extreme cases of leaking suction valves the actual compression line may even fall

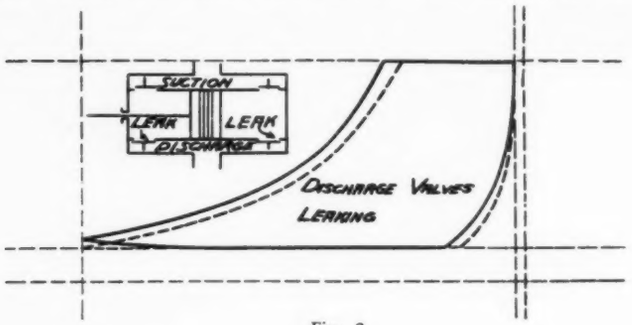


Fig. 2

considerably below the isothermal line, thus causing the actual line to "flatten" out.

The discharge line will curve downward with leaking suction valves as in the case of leaking piston rings; consequently, it is not possible to predict where the trouble is by observing the characteristics of this line. In both cases the capacity of the compressor cylinder is considerably decreased.

Since a leaking suction valve will allow gas to pass back into the suction line as long as the pressure within the cylinder exceeds that in the suction line, the amount of gas remaining in the cylinder when re-expansion takes place is reduced as in the case of leaking piston rings. It is obvious, therefore, that the re-expansion line will approach the vertical, as when the piston rings are leaking.

As a card from a cylinder with leaking piston rings is very similar to one from a cylinder with leaking suction valves, it may be difficult at times to differentiate between the two defects by observing the card even with the aid of the limiting lines. However, one sure indication of bad leaking suction valves is heating in the suction line near the compressor. This heating of the incoming gas reduces the efficiency of the compressor, and consequently the capacity.

Discharge Valves Leaking

Figure 2 is a card from a cylinder in which the discharge valves are leaking. During the suction stroke gas is leaking

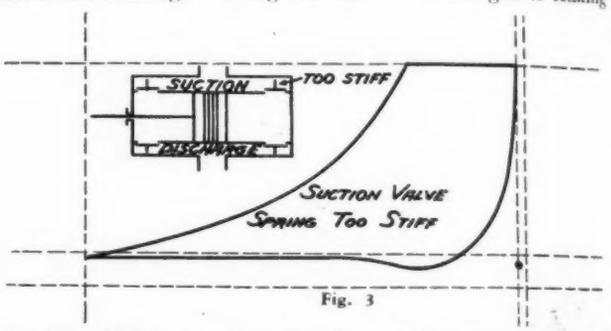


Fig. 3

past the discharge valve, thereby causing the suction line to curve upward due to the pressure building up in the cylinder. This condition brings about a higher initial pressure at the beginning of the compression stroke, and since gas continues to leak back until the pressure within the cylinder equals that in the discharge line, the actual compression line will remain above that of a "perfect" card. In extreme cases of leaking discharge valves the actual compression line may fall above the adiabatic line. Obviously, compression under such conditions is very inefficient, and there is an appreciable loss in horsepower.

The discharge line is not influenced by the condition of the discharge valve, so the line will be normal on this card.

The re-expansion line will have considerable curvature and the characteristic will be the same as that produced by a cylinder with large clearance. This condition is brought about by gas leaking back through the discharge valve after the piston has started on the suction stroke. It can be seen that the effect of gas leaking back at this point through the discharge valve is to bring about a reduction in the amount of gas admitted to the cylinder during the suction stroke. Since the cylinder clearance is one of the most important factors affecting compressor efficiency, and as the

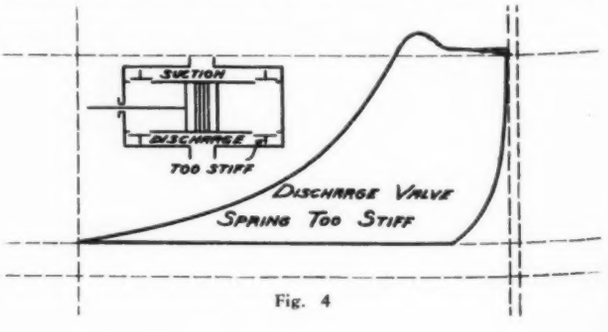
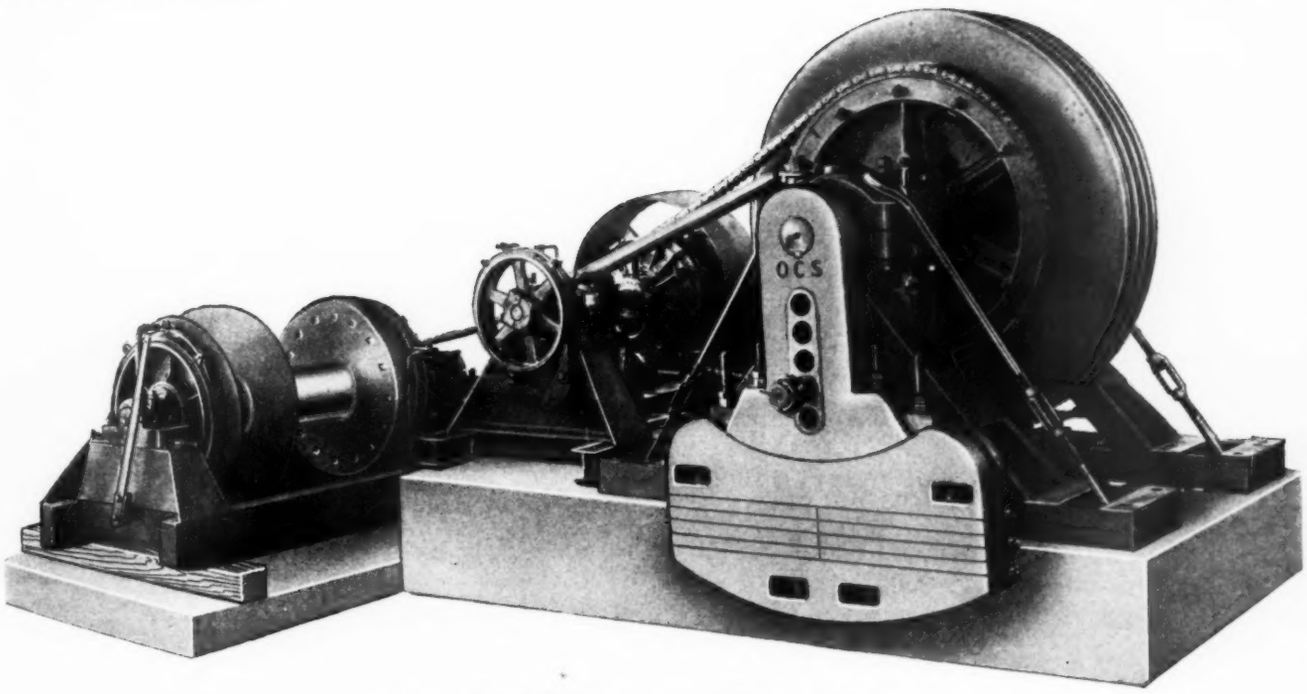


Fig. 4

OCS

Universal Rig Fronts

Any Engine **Any Motor**



for Drilling or Pumping

The Deepest Wells in the World

Manufactured by

THE OIL COUNTRY SPECIALTIES MFG. CO.

COFFEYVILLE, KANSAS

HYNES, CALIF. TULSA; SEMINOLE, OKLA. SWEETWATER; HOUSTON, TEXAS HOBBS, N. MEXICO

HILLMAN-KELLEY, INC., 2437-39 HUNTER ST., LOS ANGELES, CAL.

When writing THE OIL COUNTRY SPECIALTIES MFG. CO. *please mention The Petroleum Engineer*

effect of leaking discharge valves is similar to that of large clearance, it will be realized that considerable loss can occur when the valves are in bad condition.

Suction Valve Spring Too Stiff

The effect of too stiff a suction valve spring is brought out in figure 3. Almost every good indicator card will show a small depression in the suction line when the suction valve opens, but it should not amount to more than a small point where the indicator pen falls below the suction pressure line and then quickly rises again to the suction pressure. This small depression is due, of course, to the tension in the suction valve spring which requires an appreciable reduction in the suction pressure before the valve will open. When the suction valve spring is too stiff, a greater reduction is required in the suction pressure to overcome the tension in the spring, and a considerable depression in the suction line appears on the indicator card. In addition, the suction line on the card may remain below the suction pressure throughout the entire suction stroke. This condition is undesirable because the reduced suction pressure within the cylinder will not allow as complete a filling as would be the case where the valve spring was properly set. It is evident that this condition brings about a decrease in the capacity of the compressor, but no other serious disadvantage results.

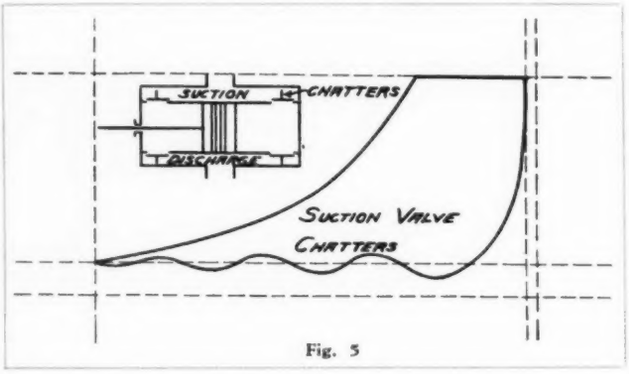


Fig. 5

The effect of a chattering suction valve is somewhat similar to that of too stiff a suction valve spring, but usually a chattering inlet valve will produce two or more depressions of considerable magnitude while too stiff a spring will give only one depression.

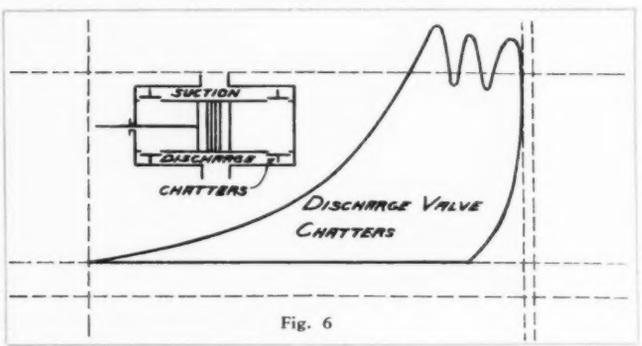


Fig. 6

Trouble of this nature will seldom be encountered with the type of valves on some compressors when working under pressures reasonably high.

Discharge Valve Spring Too Stiff

Too stiff a discharge valve spring will produce a card similar to the one shown in figure 4. This trouble will affect only the discharge line, but is a more serious defect than when the suction valve spring is too stiff. All actual compressor cards will show a discharge line that is somewhat irregular throughout its entire length, but the characteristics should never be as indicated in the above figure.

In the case of a discharge valve spring being too stiff the pressure in the cylinder during compression must reach an excessively high value in order to overcome the tension in the spring and allow the valve to open. The additional pressure required to open the valve is indicated by the pronounced "hump" at the point where discharge begins. Where the valve spring is extremely stiff, the discharge line will remain considerably above the actual discharge pressure line throughout its entire length.

There are two chief disadvantages resulting from too stiff a valve spring in the discharge valve. When the compressor is working under a reasonable ratio of compressions, the more serious effect is the additional horsepower required to compress a given amount of gas. This is evident when it is realized that the higher the discharge pressure, the suction pressure remaining the same, the greater will be the horsepower required to pump a specific weight or volume of gas. When the compressor is working under a large ratio of compressions, that is, when the discharge pressure is high and the suction pressure very low, the resultant rise in temperature is likely to prove serious. Some of the loss due to this increase in temperature will show up in the re-expansion line.

As is true in the case of suction valves, trouble of this nature will not often be encountered with the type of valves used on some compressors, except when the compressors are working under suction pressures near atmospheric pressure or below.

Suction Valve Chatters

The effect of a suction valve chattering is brought out in figure 5. This trouble will seldom be encountered with the suction valves on Cooper and Worthington compressors. The suction line is the only part of the cycle affected, and there is no serious disadvantage resulting from this defect in the valve operation.

Air compressors with certain types of suction valves quite often give cards similar to the one shown above, and in some cases the effect of the chattering may even be more pronounced.

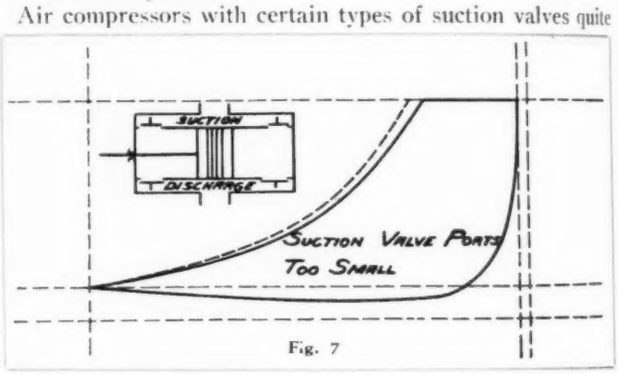


Fig. 7

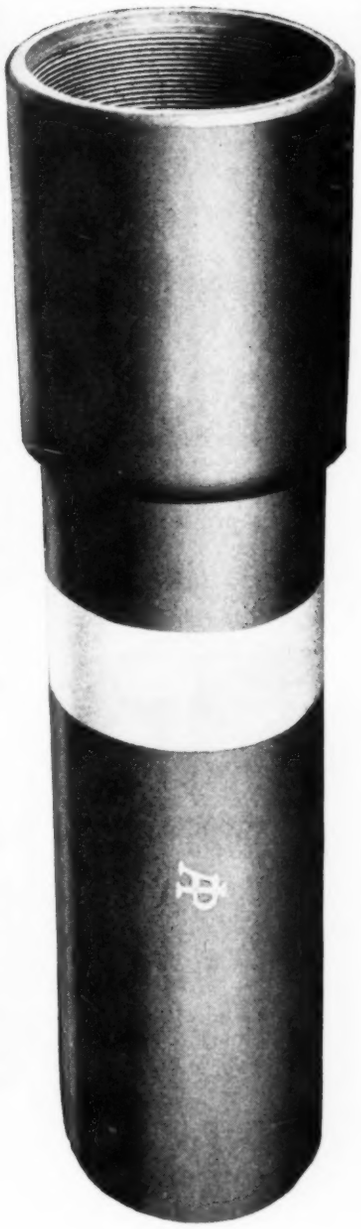
Discharge Valve Chatters

Chattering of a discharge valve will give a card similar to the one shown in figure 6. As is true of the chattering of suction valves, discharge valve chattering will not often be experienced with several compressors. The chief disadvantage from this trouble is the high peaks reached by the discharge pressure at times. The above card does not represent an extreme case of chattering such as occurs in some air compressors.

In figure 7 is shown a card taken from a cylinder in which there is a reduced pressure during the suction stroke. In this cylinder the pressure during the suction stroke falls below the actual suction pressure due to improperly designed valve ports, assuming, of course, that the suction valve is operating properly and that there is no obstruction in the intake line.

Trouble of this nature decreases the capacity of the compressor due to reduced filling of the cylinder when the suction pressure falls.

LONGER LIFE in Wells and Pipe Lines



IN ALL branches of the oil and gas industries where pipe is used, Youngstown oil country tubular goods are consistently setting new standards of pipe performance.

In thousands of wells Youngstown drill pipe, casing and tubing, both welded and seamless, are continually demonstrating their ability to "stand the gaff" of the hardest kind of oil country service.

Oil and gas pipe lines, too, are proving that wherever pipe serves these industries, Youngstown pipe invariably affords the utmost protection to pipe investments.

It will pay you to use Youngstown steel pipe in both wells and pipe lines, just as it has paid thousands of others.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

One of the oldest manufacturers of copper-steel, under the well-known and established trade name "Copperoid"

General Offices—YOUNGSTOWN, OHIO

CONTINENTAL SUPPLY CO.—1501 Locust St., St. Louis, Mo.
YOUNGSTOWN STEEL PRODUCTS CO.—3000 Santa Fe Ave., Los Angeles, Cal.
INTERNATIONAL SUPPLY CO.—Tulsa, Okla.
REPUBLIC SUPPLY CO.—2122 E. 7th St., Los Angeles, Cal.

YOUNGSTOWN

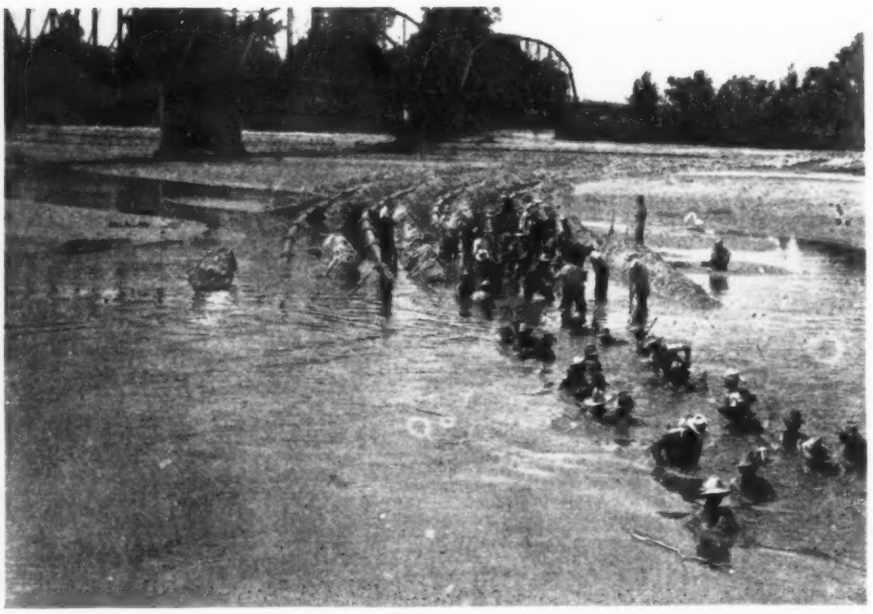
GALVANIZED SHEETS PROTECT SAVE WITH STEEL

When writing THE YOUNGSTOWN SHEET & TUBE COMPANY *please mention The Petroleum Engineer*

Good Time Made

Building Four-Line River Crossing

TO insure ample line facilities in the event of a break in its major river crossing, the Quinton Natural Gas Co. swung four 10-inch lines across the frequently turbulent Canadian river near Whiteford, Okla., where the 16-inch gas transmission system coming north from the Quinton gas field crosses the river.



Crossing the deep part of the Canadian River with the Quinton gas line.

Approximately 15 days' time was required to complete the crossing, which was made up with 8,013 feet of 41.85-pound line pipe. The river was at its low stage and the actual water crossing was approximately 600 feet, while the remainder of the river section was buried in the sand in the river bed.

The crossing was made with 20-foot, 10-thread screw pipe with long couplings and faced for clamps. As was all the other pipe going into the line, it was given a priming coat at the mill and painted before lowering.

To build the approach to the section which was lowered in the water the construction crews laid the four lines out on the sand. Although the going was heavy, tractors were used in the sand for lining up, lowering and painting, the same as if the line had been going through level country. Tractors were used to make the 18-degree cold bend upstream and to pull the line across the water.

After the section of the crossing on the sand was made the 18-bolt, 1250-pound, 10-inch river clamps were bolted on. Working at the same time, laborers were cutting the approaches and shoveling sand out of the 30-inch trenches spaced approximately 20 feet apart. Following this job, the tong gang started building the section which crossed the stream. Each of the approximately 600-foot sections going in the water was plugged and pulled across with a tractor with a side winch and which was on the shore. Instead of using a block and tackle in pulling the line across, the crews lashed the winch line to the plugged end of the line and which was secured to a raft and pulled it across with a straight pull. By using this method the water crossing was made in the time it would have required to rig up a block and tackle.

When the four sections crossing the water were lowered to the bed of the channel the crews of laborers waded into the water, which was about shoulder deep, and cut a trench with long-handled shovels. By working alongside the line and then cutting under it the line slid into the trench.

The four lines crossing the river tie into a 20-inch header on the outlet side and inlet side. The header was welded in the field with acetylene and each of the four lines was welded to the header. The 16-inch line was also welded to the header. All of the welds were reinforced with straps and 500-pound test gates were used.

The line was designed and built by the Natural Gas Engineering Corporation, Tulsa, Okla.

Making a deep cut on the river bank.

General view of the river crossing.

Some Considerations in « « « « «

The Making *of* Hot Roll Mill Grease

By S. J. CAPLAN, *Chemical Engineer*

HOT roll mills used in the manufacturing of sheet iron, tin plate, etc., run at an average temperature of 600 degrees F., after they have been warmed up thoroughly. The bearing surfaces under the same conditions will be between 350 degrees F., and 450 degrees F. This means that the grease which is to lubricate these bearings must withstand the heat of approximately 400 degrees F. and, in addition, the tremendous bearing pressures when sheets are passed through the rolls.

In manufacturing a lubricant that will adhere to the brasses and lubricate them under these conditions, it is imperative that all of the organic compounds used be of a very high flash point.

Let us assume that a mill has been shut down for repairs and therefore starts operating cold. Ordinary hot neck grease is too stiff for the cold bearings. In order to lubricate the brasses at this stage, a semi-fluid viscous grease is used—a "Starting Up Grease."

"Starting Up Grease"

Petroleum Pitch	40 per cent
Melting point—163 degrees C.	
Flash point—515 degrees F.	
Degras	10 per cent
Heavy Cylinder Oil	30 per cent
Flake Graphite	20 per cent

This grease is made by melting the pitch in a fire kettle and gradually adding the degras, cylinder oil and graphite.

This "Starting Up Grease" is swabbed on the necks of the rolls until the necks have warmed up. When the necks are warm, fresh "Hot Neck Grease" is applied.

"Hot Neck Grease"

Petroleum Pitch	47 per cent
Melting point—125 degrees C.	
Flash point—535 degrees F.	
Degras	7 per cent
Soapstone	27 per cent
Heavy Cylinder Oil	19 per cent
Sp. Gr—18.50 degrees Be'.	
Flash—504 degrees F. Fire—570 degrees F.	
Vis.—204 Saybolt at 210 degrees F.	

This Hot Neck Grease is made exactly like the "Starting Up Grease." The soapstone is added at the end of the process.

A large portion of the "Starting Up Grease" and "Hot Neck Grease" melts off the roll necks and drips into the pits. The standard practice is to gather these drippings at the end of the week and turn them over to the mill grease man. It is the mill grease man's job to recook this waste grease and by judicious treatment convert it into a product which is superior to the fresh "Hot Neck Grease" used—superior, because it usually stands up longer on the roll necks when the rolls are running at a maximum temperature.

The grease maker in the mill fills his grease kettle about half full with the waste grease from the pits and immediately starts heating the kettle. Heat is applied by gas, oil or coal. A gas or oil fire is more easily controlled than a coal fire. In case the kettle shows a tendency to boil over, the heat can be removed almost instantly when gas or oil is used. Where coal is used one must be constantly on the alert to prevent a "boil-over." After the kettle has been charged with the waste hot neck grease, about 25 per cent additional weight of fresh "Hot Neck Grease" is added to the charge. This amount is variable and depends on the condition of the returned grease. The fresh hot neck is added because it has been learned that it is easier to remelt the returned grease under this condition and also because the recooking of the waste hot neck grease alone usually produces a product that is too hard and brittle for use on the mill. The grease maker aims to melt the entire batch and when it is thoroughly melted to obtain a grease that has a good "body" and flexibility. A good method of checking the reboiled hot neck is by sticking a sample of the cooled grease (the size of a pea) on the end of a thermometer bulb. The thermometer bulb and grease are then slowly heated in an air bath immersed in oil. When the grease melts and runs off the thermometer bulb, the temperature is read and this may be considered the melting point of the grease. Reboiled hot neck should show a melting point of approximately 400 degrees F.

After about twelve hours of cooking, the reboiled grease should be completely melted and very fluid. At this point the heat is turned off and the grease is allowed to rest for an hour or two without stirring, to permit small particles of iron and dirt to settle to the bottom of the kettle.

About four feet below the outlet of the grease kettle is a brick or concrete rectangular receptacle about a foot in depth into which the grease is to be run. This receptacle is thoroughly whitewashed so that the cooled grease will not stick to it.

When the grease is ready to run out, a screen is attached to the outlet pipe to catch any particles of wood, etc., that may be in the grease. The valve is now opened and the entire charge of reboiled grease is run into the limed receptacle. When the grease is stiff enough to support the weight of a man standing on a plank placed on the grease, the grease is ready to be cut. The bars are cut into blocks about 2 inches by 2 inches by 10 inches. It is self-evident that the entire charge of grease should not cover the receptacle to a depth much greater than 2 inches.

SYFO CLINOGRAPH

A User Speaks

JOHN A. DEERING
2ND FLOOR NIELM EMPERSON BUILDING
HOUSTON, TEXAS

May 21, 1930.

Sperry-Sun Well Surveying Company,
1504 First National Bank Building,
Dallas, Texas.

Gentlemen:-

In reply to your letter of May 20th with reference to the SYFO Instrument which I leased from you and ran in the Hirsch well No. 1 just east of my producing well No. 5 at Humble, will say that I deepened Hirsch No. 1 from around 2700 feet to 4660 feet into salt. I fully expected to pick up the producing sand somewhere between 4200 and 4400 feet, having missed it entirely I felt there must be something wrong with the hole and in connection with this feeling, I took up the matter of using one of your SYFO Instruments to find out whether or not my hole was crooked. I discovered that from 3000 feet on down to 4300 feet I was from three degrees to twenty one degrees off of vertical. We could not run the machine deeper on account of heaving shale, but we fully believe that we were considerably more out of vertical than we were at 4300 feet, where the instrument showed we were twenty one degrees off.

I then cemented this hole up to 2640 feet and drilled the hole over again, using the SYFO about every nundred feet so as to keep a record of how the nole was running and I then picked up the sand at around 4160 feet and made an 800 barrel well. The SYFO thus saved me the cost of a well which amounts to real money when drilled to the above depth.

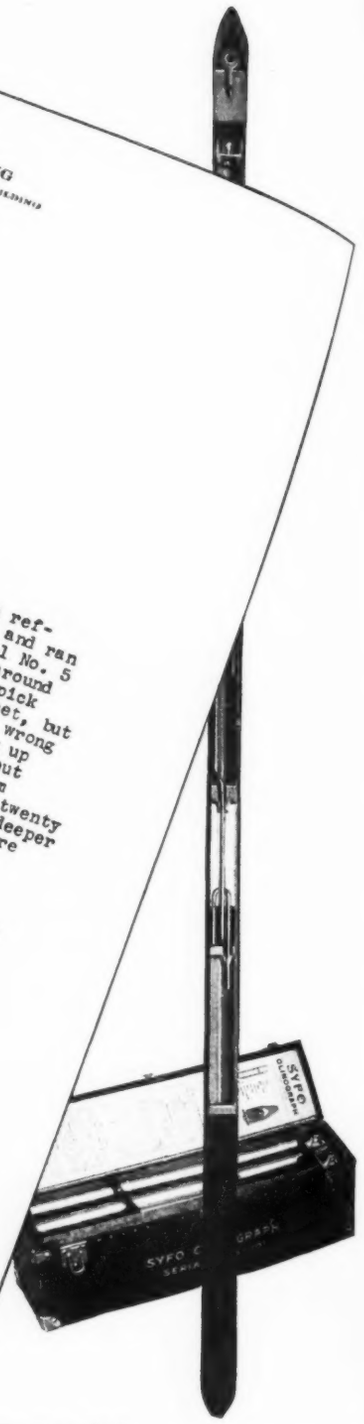
I am entirely satisfied with this instrument and believe that it is the best of its kind on the market and far ahead of any other instrument with which I am familiar.

In this connection, I would like also to express my appreciation of the prompt service which your company has given me.

JAD-D

Yours very truly,

John A. Deering



The survey of drilling progress is today accepted as a necessary and economical precaution.

Investigation of the SYFO Clinograph will convince you that here is the best, most accurate, speediest, safe and economical instrument to use. Leased only.

WRITE FOR DESCRIPTIVE LITERATURE AND RATES

SPERRY-SUN WELL SURVEYING CO.

Main Office - 1608 Walnut Street

PHILADELPHIA, PA.

DALLAS, TEXAS: 1504 First Nat'l Bank Bldg.—TULSA, OKLA.: 402 Petroleum Bldg.—HOUSTON, TEXAS: 1420 Esperson Bldg.

When writing SPERRY-SUN WELL SURVEYING CO. *please mention The Petroleum Engineer*

Pressure-Flow Studies *of* Petroleum Products

By **FRED W. PADGETT,** *Professor of Petroleum Engineering, University of Oklahoma*

THE fundamentals governing the flow of fluids through tubes now are well understood and can be applied in a practical way. Sometimes, however, the engineer does not include in the grouping plastic flow as distinguished from fluid flow and the relation of one to the other.

Fluid Flow

Two regimes of fluid flow are recognized—viscous and turbulent flow—separated by a critical or transition region. The law of viscous flow was first found by Poiseville, a French physician and scientist, in the course of a study of conditions governing the flow of the blood stream in the body. Since that time Poiseville's equation for viscous flow has been checked by many investigators and found to be substantially correct. The equation can be stated as follows:

$$Q = \frac{V}{T} = A\frac{pD^4}{ln}$$

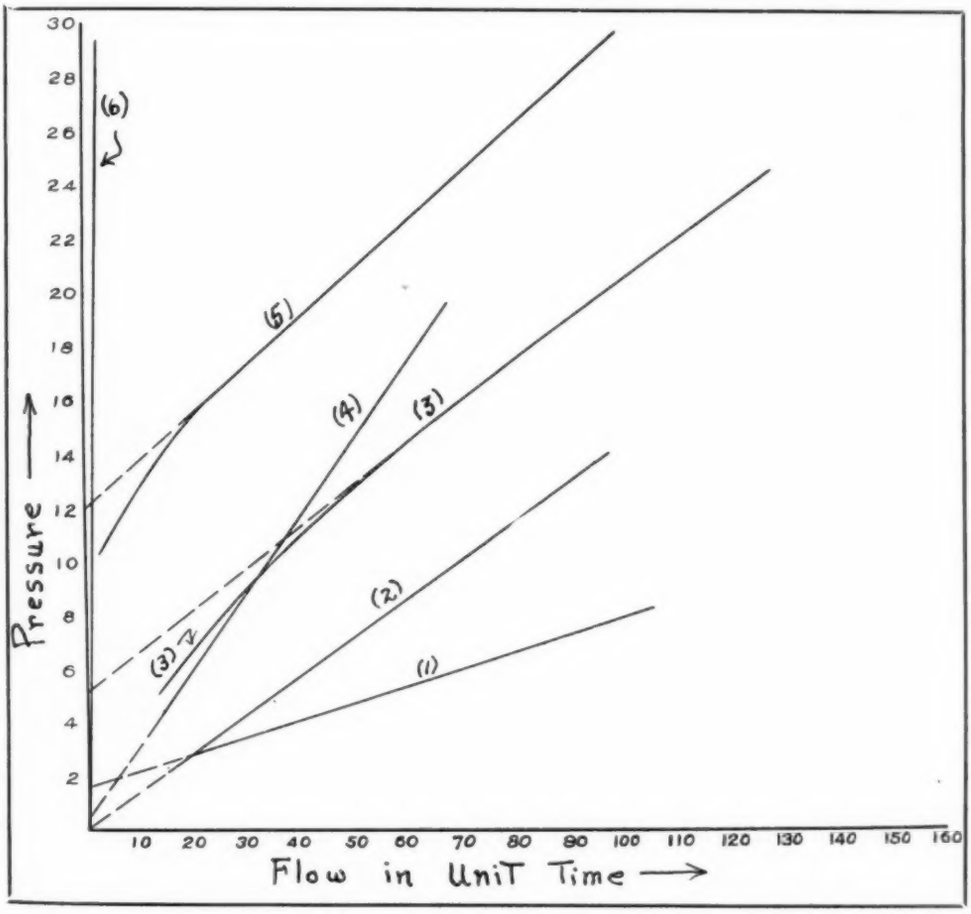
Where Q = volume in unit time through the tube or pipe,
V = Volume
T = Time of flow of volume V
A = A constant
p = Pressure drop through the tube
D = Inside diameter of the tube
l = Length of tube
n = Absolute viscosity.

A conception of what absolute viscosity really is results from a hypothetical consideration of two parallel plates located a certain distance apart and the space between the two plates filled with a viscous liquid. It is not unreasonable to assume that the force necessary to cause one of the plates to move with the velocity I, relative to the other plate, will be directly proportional to the area of the plate, directly proportional to the velocity, but inversely proportional to the distance apart of the plates. These assumptions could be stated in the form of an equation as follows:

$$F = N\frac{AI}{X}$$

F = Force to produce velocity I
A = Area of plate
X = Distance apart of the plates
N = Constant

Placing A, I and X equal to one, then F = N, or the resistance of the liquid between the plates. This resistance, then, represents the absolute viscosity of the liquid, and may be stated in this way: "Absolute viscosity is the force necessary to move unit area of plane surface with unit speed relative to another parallel, plane surface from which it is separated by a layer of the liquid of unit thickness." In the c. g. s. system, then, the unit of absolute viscosity based on the foregoing reasoning must be one dyne-second per square centimeter. This unit has been designated the poise, in honor of Poiseville. The unit generally preferred in engineering work is the centipoise. Poises are changed to centipoises by multiplying the poises by 100. The viscosity of water at 20 degrees C. is .01 poise, or 1 centipoise.



When a condition of viscous flow exists in a pipe, increase in velocity will result in the critical region being attained and thereafter turbulent flow. The critical velocity is a function (nondimensional) of the diameter of the pipe, density of the liquid, and the viscosity:

$$\frac{DIcS}{N} = K$$

The value of K in the above equation is thought to be in the neighborhood of 2000, although

various investigators report a very wide variation.

The law of turbulent flow (Fanning's equation) can be stated as follows:

$$Q = \frac{V}{T} = B\sqrt{\frac{PD^5}{lfs}}$$

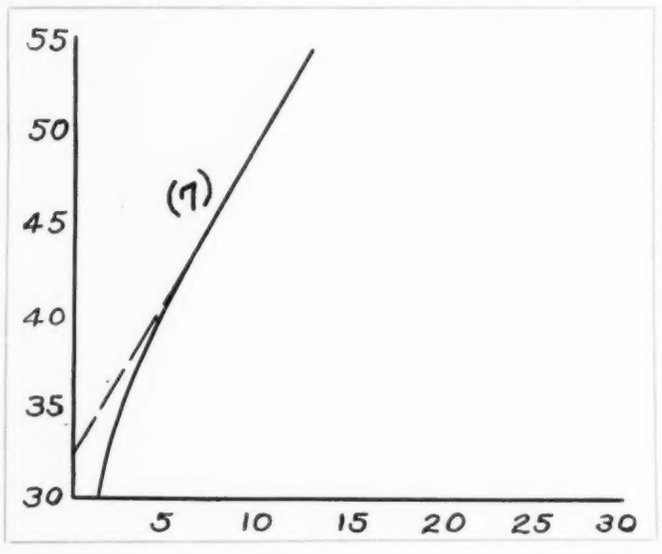
in which s is the density of the oil, f is a friction factor (not coefficient of friction) and B is a constant. The friction factor also is a function of $\frac{DIS}{N}$ and its value generally is taken from a graph of $\frac{DIS}{N}$ against F, the friction factor. Wilson and his co-workers (*Journal of Industrial and Engineering Chemistry*, Vol. 14 [1922], page 105) show such a graph and also recommend the use of Fanning's equation in pipe line calculations for both viscous and turbulent flow.

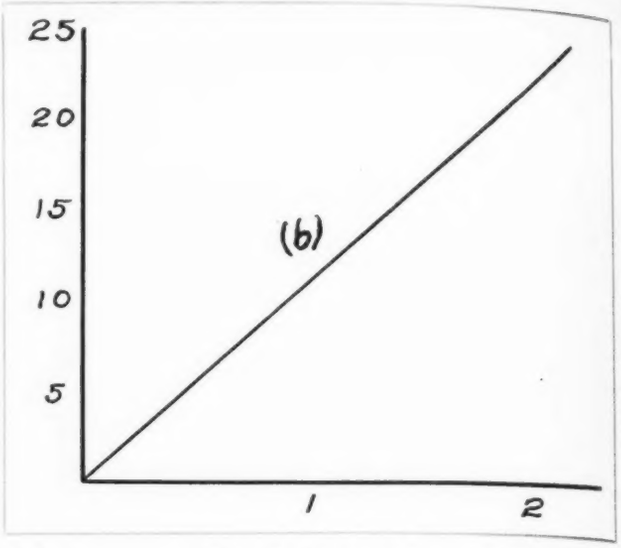
Plastic Flow

In the case of true liquids continuous deformation occurs, no matter how small the shearing force applied. In the case of plastic substances a certain force must be applied before continuous deformation occurs.

The difference in flow characteristics of petroleum products, some of which are true liquids and others of a plastic nature, is illustrated in the accompanying figure. These curves were determined for a number of crude and refined products, part being products secured in the course of refining Mid-Continent petroleum to bright stock. It should be observed that the curves result from a plot of pressure against flow in unit time, the substance flowing through a tube of constant length and diameter. The apparatus used was a modified Saybolt viscosimeter so arranged that varying pressures could be applied.

Referring to the figure, it is observed that the raw cylinder stock gives a straight line nearly intersecting the origin; in other words, the substance displays, at this temperature, nearly true liquid characteristics. This follows from the equation for viscous flow, which reduces to Q = CP when the diameter and length of the tube are constant and the viscosity constant. This is the equation for a straight line beginning at the origin. True liquids, then, when the flow is viscous, give straight lines which intersect at the origin. The treated cylinder stock, at the same temperature, shows an entirely different kind of curve; it possesses plastic characteristics. At the lower pressures it displays an expotential curvature, but becomes a nearly straight line at the higher pressures. This is the type of curve which is characteristic of many substances of a plastic nature. The reason for the curvature on the lower part of the line is not well understood, but it is assumed that an extension of the straight portion of the curve to the pressure axis gives a value closely related to the yield value of the substance.





An interesting curve in the figure is that representing the pressure-flow characteristics of the product designated as flux. The flux in this case is a viscous residual product obtained when distilling certain of the Mid-Continent oils to secure "overhead cylinder stock." It is rather surprising that this substance should display nearly true liquid characteristics at so low a temperature. An interesting problem for investigation would be a comparison of pressure-flow curves at different temperatures of blown, residual and native asphalts with softening points, ductilities and float tests thrown in the picture.

The curve for clay dispersion shows the effect of mixing clay and oil. The mixture consisted of equal volumes of contact clay through the 300-mesh screen, and pharmaceutical oil.

In conclusion, we can formulate a simple equation to compare plastic with viscous flow. The equation for viscous flow, when length, diameter and viscosity are constant, can be reduced to an equation of this form, Q = Cp, in which C is a constant. In the case of plastic flow the nearly straight portion of the curve will be represented by an equation like the following:

$$Q = M\,(P - Y)$$

in which M is a constant, P is the total pressure and Y the yield value of the substance, the force which must be applied before uniform continuous deformation results. In the first equation, that for viscous flow, when Q = O, p = O, or the curve intersects at the origin. In the second equation when Q = O, Y = P, or the curve starts on the pressure axis at a point equal to the yield value.

The curves might be further complicated at high pressures due to a change from viscous to turbulent flow. In this case those plastic substances which show an expotential curvature at low pressures would ultimately become somewhat S-shaped.

Key to Figure

(1) Clay dispersion.
(2) Bright stock at 90 degrees.
(3) Acid-treated cylinder stock at 90 degrees F.
(4) Raw cylinder stock at 90 degrees F.
(5) Cup grease at 90 degrees F.
(6) Flux at 85 degrees F.
(7) Petrolatum at 84 degrees F.

WHY ARE YOU BUYING

NEILAN

Regulating Equipment ?

. . . we asked the Chief Engineer of a major oil company. .

VISIT OUR OIL SHOW EXHIBIT

Booths 87 and 124

OKLAHOMA BUILDING

The sales of NEILAN automatic control equipment have more than doubled in the past twelve months because of this NEILAN policy to give more than just quality control equipment.

You can get the same service as the Chief Engineer mentioned at right from your nearest NEILAN Engineer. Call on him or write direct to us—without obligation on your part.

"WELL," he answered, "we are specifying NEILAN control equipment because we are getting not only perfected, precision-made instruments . . . we are also getting the advantage of the valuable experience of NEILAN Engineers. This means recommendations of the proper type and size of equipment . . . thorough instructions (in many cases actual supervision) on how to install, adjust and properly operate all NEILAN equipment. Suggestions are often made that improve our plant performance. We are buying NEILAN regulating equipment because we are getting NEILAN regulation counsel and guidance as well."

NEILAN CO., Ltd.

(Formerly Neilan, Schumacher & Co.)

641-651 Santa Fe Avenue - - - - Los Angeles

Branch Offices:

NEW YORK, 30 Church St. . . . . Rudolph B. Werey, Mgr.
CHICAGO . . . . . 55 East Wacker Drive
DALLAS, 5934 Victor St. . . . . Eldrige V. Weaver, Mgr.
SAN FRANCISCO, 16 Avila Road . . . William S. Waldrip, Mgr.
MARACAIBO, Venezuela, Apartado 298 . . Patrick H. Heeney, Mgr.

Representatives (stock carried):

TULSA, 221 East Archer St. . . . Camp-Morgan Co.
HOUSTON, 1400 Conti St. . Maintenance Engineering Co.
General Mid-Continent Engineer . . . Roy O. Campbell

"YOU CAN BE SURE OF NEILAN PRODUCTS"

When writing NEILAN CO., LTD., *please mention The Petroleum Engineer*

Novel Method of

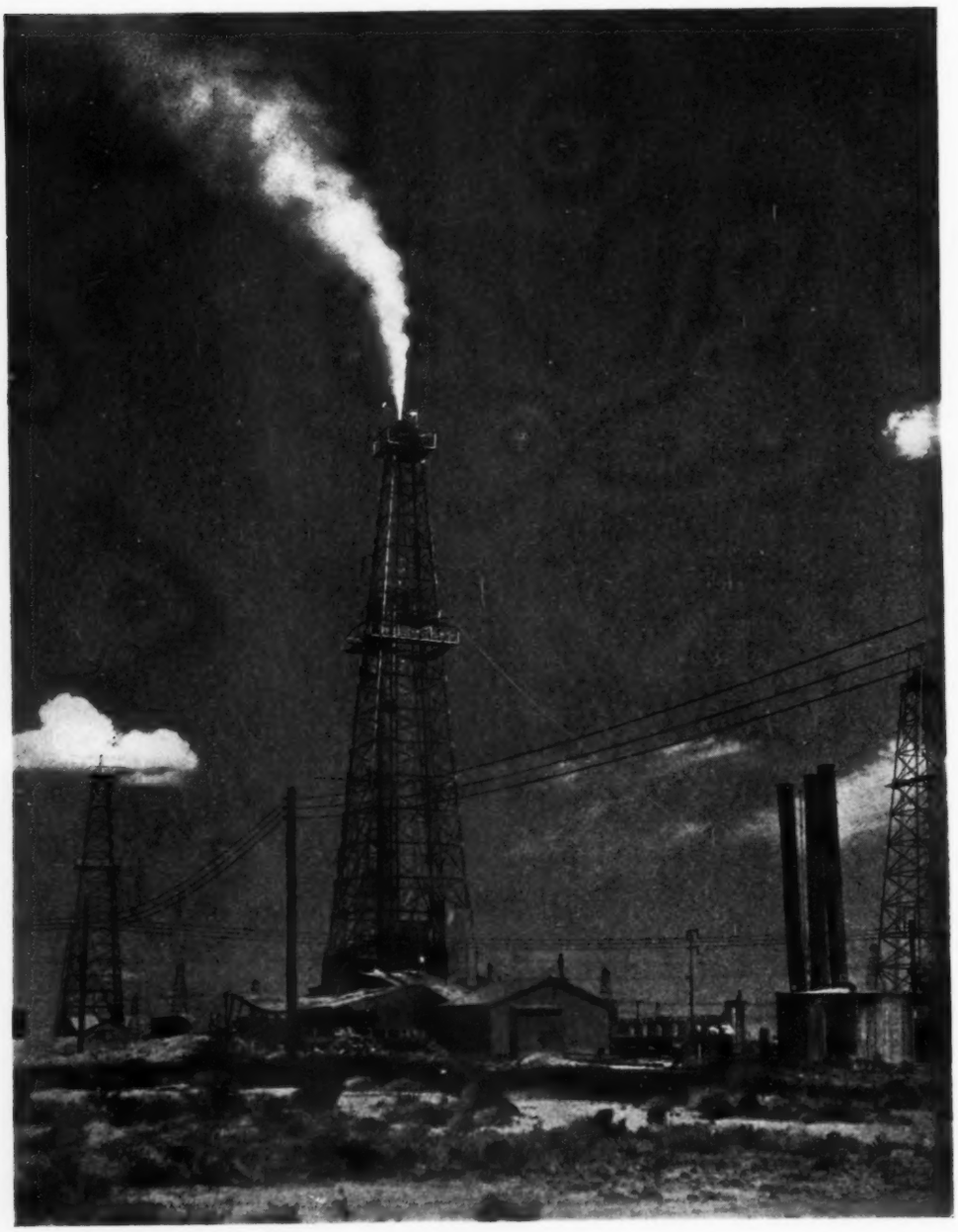
Handling Gas *from* Deep West Texas Well

BIG LAKE Oil Company's well No. 2-C, located in Section 1, Block 2, University Lands, Reagan County, Texas, was spudded in March 10, 1929. The hole was started with standard cable tools.

On March 24, 1929, the company changed over to rotary tools and drilling continued with a 15-inch bit. Heavy equipment of the very heavy type was installed, consisting of electric drive, two 7¼-inch by 18-inch power-driven slush pumps, a 26-inch rotary table, a 6-inch swivel and a double deck crown block.

At 2896 feet a string of 10¾-inch casing was set. Drilling was then continued to a depth of 5472 feet, which was reached on September 16, 1929. It was decided to change over again to cable tools, so a string of 7-inch casing was set at 5466 feet. From this point drilling was continued with cable tools until December 12, 1929, when a depth of 8000 feet was reached. A string of 5⅜-inch casing was set at 7939 feet.

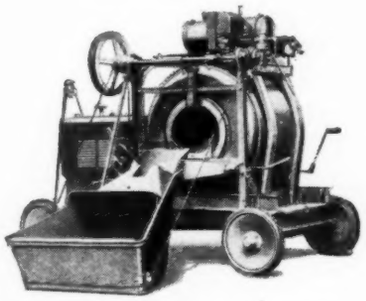
Experience with other deep wells in this field made it advisable to drill into the deep pay with rotary tools. On December 22, 1929, gas and oil were encountered from 8187 to 8190 feet in sufficient volume to cause some difficulty in keeping drilling fluid in the hole. Subsequently, however, the hole was deepened to 8232 feet, at which point the well produced from February to May, 1930, at an average daily rate of 650 barrels oil and several million feet of gas.



On June 11, 1930, it was decided to deepen this well from 8332 to its present depth of 8603 feet. When deepened to the latter depth the daily production increased from 1159 barrels oil, July 8, to 2192 barrels daily on August 16. The gravity of the oil is about 62 degrees A. P. I. At present the gas production exceeds 31,000,000 cubic feet daily, and the trend in the daily rate of oil production, it is to be noted, is upward.

In the accompanying photograph the novel method of handling the gas preparatory to producing the well is shown. To reduce the fire hazard around the well, a pipe or riser was connected from the casinghead to the top of the derrick to carry off the gas. How effectively this was accomplished is demonstrated in the photograph.

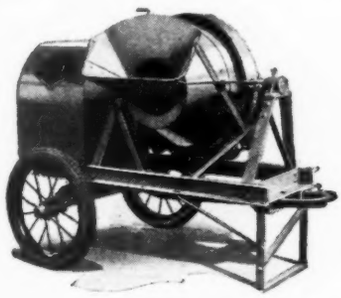
For every concrete job in the oil field



Koehring Dandie Mixer

THE famous Koehring Dandie — handy, long-service quality mixer. Worm gear drive enclosed in oil bath, charging skip low enough for wheelbarrows without runway! Folding steel platform, wide batch hopper, hoist! Batchmeter, automatic water measuring tank.

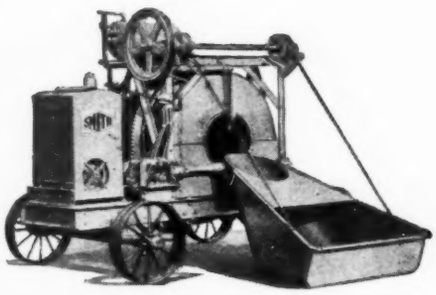
Write for Dandie catalog.



Smith Tilting Mixer

SHORT swing of drum means fast discharge! Big wide charging hopper, only waist-high, saves your back and means fast charging. Smith end-to-center mixing action delivers uniform quality concrete! 3½-S may be equipped with power charging-skip, steel or rubber tires; water tank.

Smith Non-Tilting Mixer



BIG liberal drum openings permit wide skip throats and wide discharge chutes which means fast charging and discharging! Wide, roomy high-speed charging skip! *Paver type* — drum crosswise of frame, and distributing spout! Automatic water measuring tank! Auxiliary water pump when city system is unavailable! Wide feed chute or power charging-skip! Steel wheels or rubber tires! Ask N. E. C. for Smith Non-tilting Mixer Catalog.

Every type and capacity mixer in National Equipment Corporation lines — from the smaller capacities on this page to the great Heavy Duty Koehrings and Smiths.

The N. E. C. lines offer the right mixer for any job, great or small, and include the Weigh-Mix which proportions aggregates by *weight!*

National N.E.C. service behind every mixer. Write N. E. C. for catalogs!

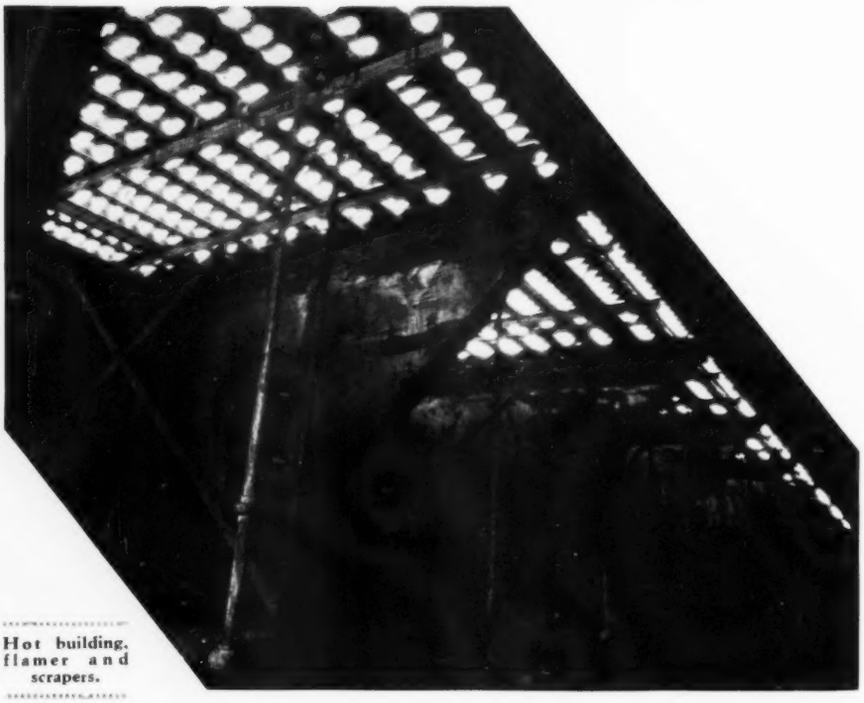
Address nearest of these three:

LELAND EQUIPMENT CO.
Archer and Guthrie Sts.
Tulsa, Oklahoma
Telephones: 4-1114—L. D. 10

ALAMO IRON WORKS
Santa Clara and Montana Sts.
San Antonio, Texas
Telephone: Crockett 69

CLARK & BURROWS, Inc.
3600 Commerce St.
Dallas, Texas
Telephones: 87-2669—L. D. 558

When writing NATIONAL EQUIPMENT CORP. OR DISTRIBUTORS *please mention The Petroleum Engineer* A 5957-I-P-R



Hot building. flamer and scrapers.

Technical Aspects *of* Carbon Black Manufacture

By
C. S. DEWEY,
Research Director, Godfrey L. Cabot, Inc.

CARBON black manufacture has been accused of being an art rather than a science. It is an unusual art, however, which produces a material of such high utility. If it was at one time an art, it has certainly been gaining rapidly in scientific interest since the time when its profound effects as a reinforcing filler in rubber were discovered.

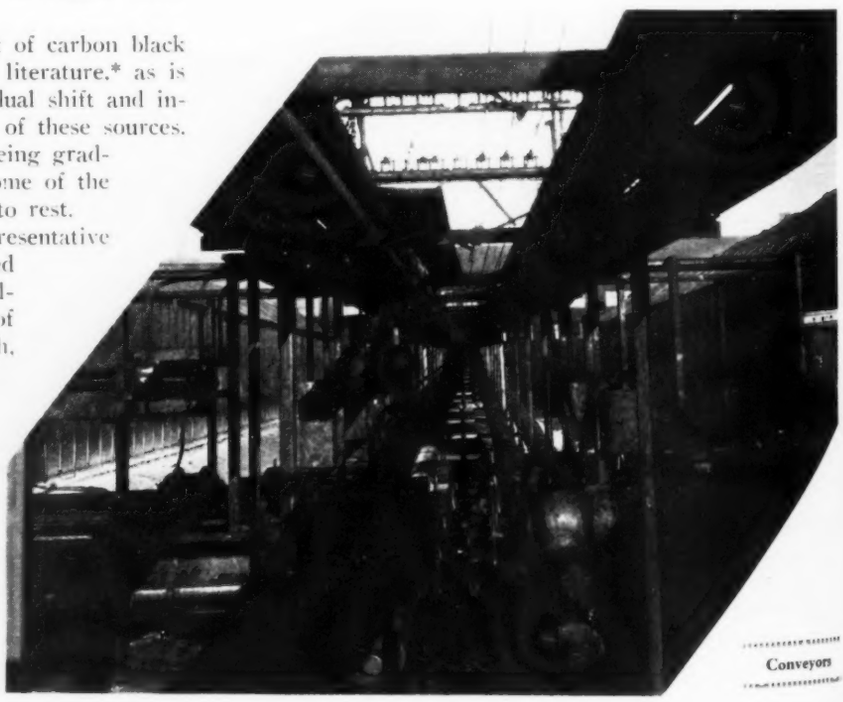
The advance in importance and interest of carbon black is reflected thoroughly in the patents and literature.* as is usual with a growing industry. The gradual shift and increase in interest is indicated by a study of these sources. The "Black Art" of the past century is being gradually exposed to intelligent attack, and some of the ghosts of former troubles are being laid to rest.

Originally, lampblack was the sole representative of this type of material. It was produced by the faulty combustion of oils, and collected from the smoke in a long series of baffle chambers. Its ability to form smooth, stringy mixes with oils accounted for its general use in black inks. During the past seventy years, the progressive changes from this original type of product, as indicated by the patents, include:

1. Collection of lampblack on a cooled surface.

2. Substitution of natural gas for smoke burning oils.

3. Distinction of properties and uses of soot collected by a comparatively cool surface in the flame, and by the settling of the smoke after leaving the flame. The latter was preferred in inks on account of its better "length", i. e., oil stringiness.



Conveyors

* Bulletin 192 of the U. S. Bureau of Mines, contains bibliography to 1920. See also Mantell: "Industrial Carbon," 1928

THE STANWOOD CORPORATION
"Oil Field Replacement Parts Division"

ANNOUNCES

A NEW and DISTINCT SERVICE for the OIL INDUSTRY

We are devoting our resources, engineering efforts and ten acre plant in the specializing of replacement parts needed for maintenance in the oil industry, from which the user can get

LONGER OPERATION AT LOWER COST

Nothing is more important to the oil producer than keeping his mechanical equipment operating for the longest period possible between shutdowns and obtaining necessary replacements at a minimum cost.

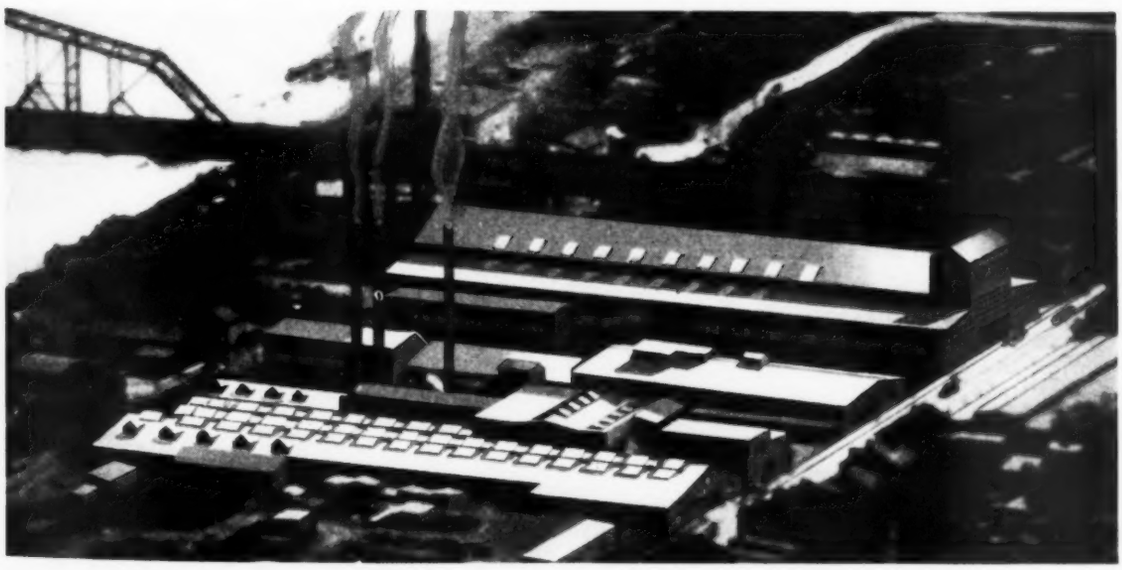
Our engineers intimate knowledge of oil field requirements assures you of products best suited to your needs and designed to give you maximum service at minimum outlay. This engineering service is available at all times to assist you.

Cylinders	Piston Rods	Valve Seats	Stills
Cylinder Liners	Piston Pins	Cages	Plate Work
Cylinder Heads	Piston Rings	Tanks	Etc.
Pistons	Valves	Towers	

Also Fulmer Acid Resisting Equipment that will give you longer operation where corrosion is present.

THE STANWOOD CORPORATION

CINCINNATI, OHIO Tulsa, Okla., Office, 327 Exchange Bank Building, 'Phone 4-7164.



THE PLANT BEHIND QUALITY PRODUCTS SINCE 1891

When writing THE STANWOOD CORPORATION *please mention The Petroleum Engineer*

4. Periodic scraping to reduce the time of heating of the deposited carbon by the flames.

5. Substitution of rugged iron collecting surfaces for the earlier water filled pans and soapstone plates.

6. Development of the three general forms of collecting surfaces: Cylindrical rollers, circular plates incorporating rotating motion either in the plate or in the scraping devices, and longitudinally oscillating bars or channels. The first was used for better grades of ink carbon; the second and third for color (and later for rubber).

7. By-product heat and power development in the plant burning units.

8. Abandonment of artificial cooling of the collecting plate as an essential operation item.

9. Thermal decomposition of oil and gas in furnace tubes to form hydrogen and fine carbon. Improvements to prevent coking of the carbon produced.

10. Catalytic thermal decomposition of gas to hydrogen and carbon.

11. Partial combustion of gas in a furnace controlled as to temperature and air supply.

12. Special grades from exploding acetylene.

13. Application of increased or reduced pressure to various methods.

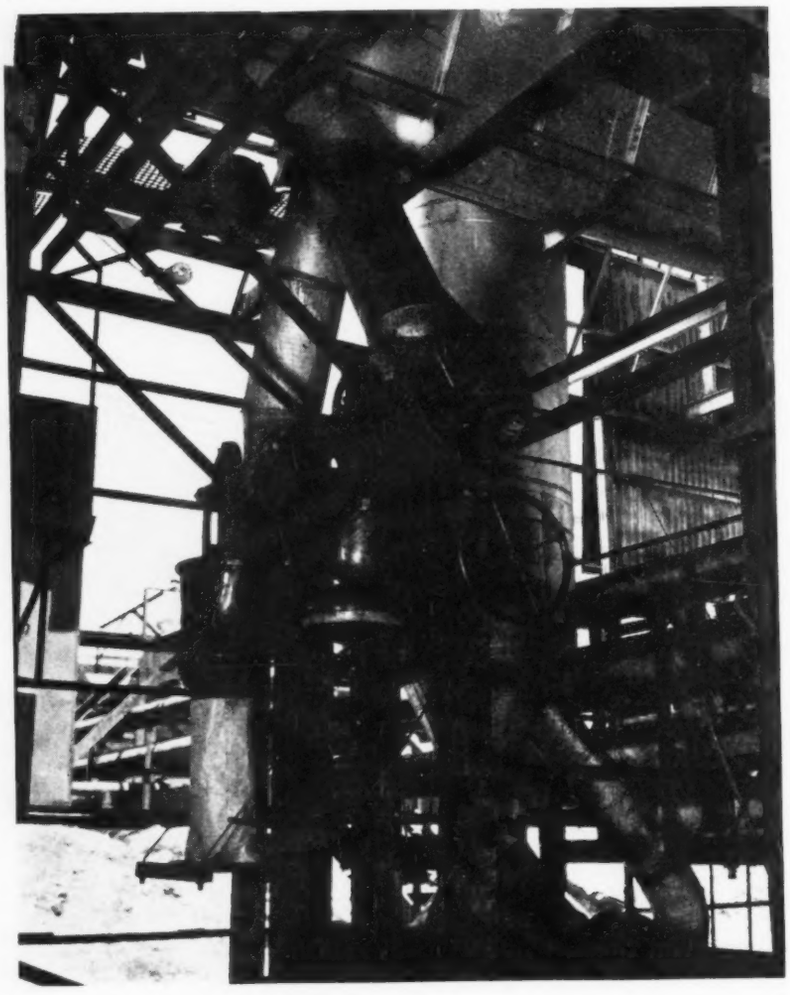
14. Decomposition of oil or gas in the electric arc to prepare special grades.

15. Special thermal cracking methods using coke, air, etc., for heat transfer.

Of the one hundred fifty patents covering the above progressive variations of the industry, only a very few are significant in present-day operating plants. Many covered minor or complicating details and have been rendered obsolete under modern competitive and economical requirements. Lampblack manufacture from oils is still active. For some purposes, especially the compounding of gray paints, it maintains a superior position. However, for black paints and high-speed inks, it has conceded the lead to the carbon blacks made from natural gas. Neither has it shared with this more recent material the latter's prominent role as a rubber pigment. The newcomer accordingly receives more current attention.

During the past ten years, the carbon black industry has grown rapidly, now maintaining a production capacity fully ten times that known in 1920. Few radical changes have been reported in plant design during this period. Progress has been made along the line of larger plant units, improved machinery, and more efficient operation. The channel plant has become increasingly important for these reasons. Less than one-tenth of the carbon black produced comes from other styles of plants.

Carbon black originates in the luminous flame of burning natural gas. The best shape of flame is obtained by passing the gas, unmixed with air, through a slotted tip at a very low pressure. The carbon is collected and removed by sliding a warm flat iron surface across the broadest portion of the flame. The exact position of this collecting plate and the amount of free air around the flame determine the amount of carbon obtainable from a given quality of gas. Carbon black plants are built with these required adjustable features in mind.



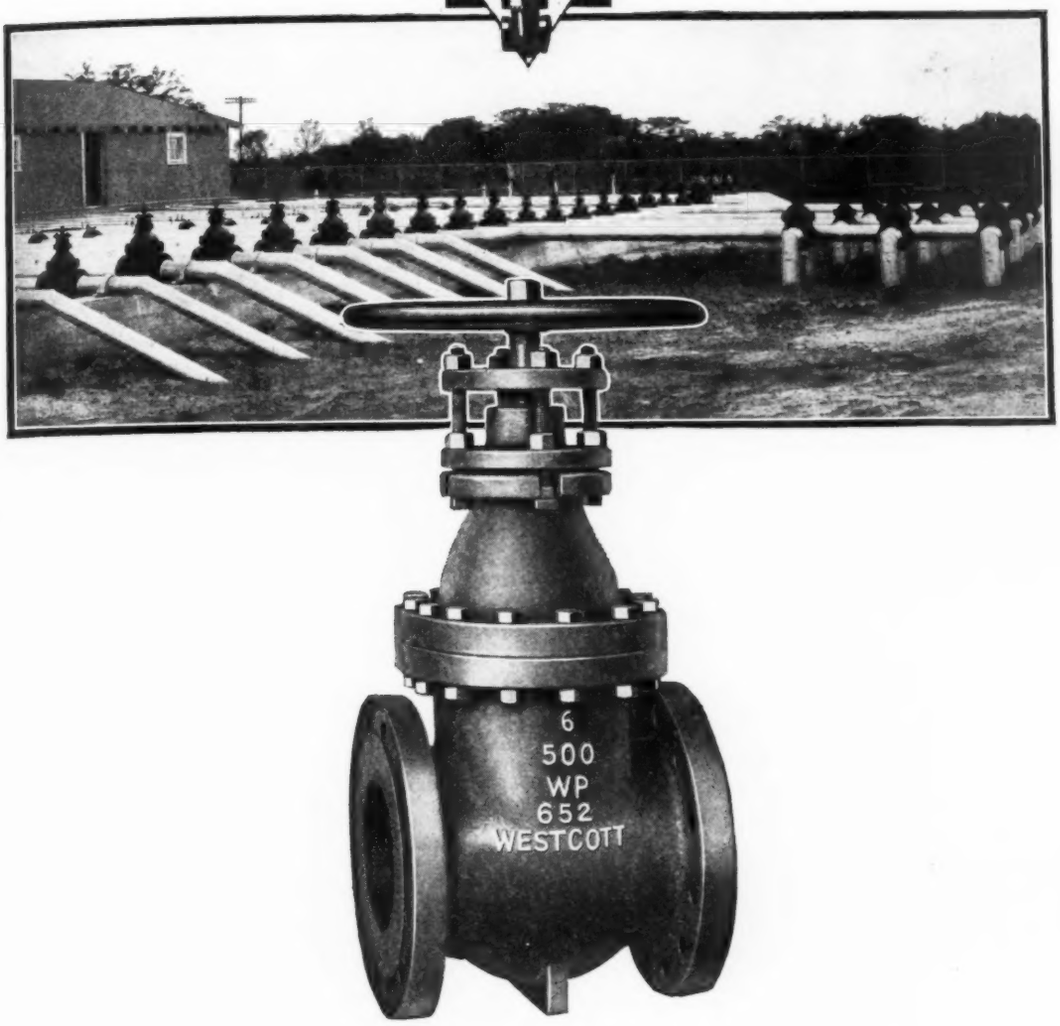
Packer

The individual factory unit in a typical modern plant is the burning shed. It contains a collecting table of ten to twelve 8-inch mild steel channels, 110 to 130 feet long. These are welded 2 inches apart to a framework which is mounted 6 feet above the ground on rail wheels. Operated by a draw bar, this table travels slowly to and fro, passing in alternation over the gas jets which are located 2 inches below the channel surface at a spacing of 3 to 5 inches, and over the scraping blades, which are located over hoppers at intervals of 4 to 8 feet. The hoppers all feed into a helical conveyor which transfers the falling carbon black continuously to field conveyors leading to the packing house. The whole burning unit comprising one channel table, supports and fittings, is covered by a sheet iron shed. This shed is provided with vents at the top for the smoke, and with draft gates around the bottom by which to control the air supply to the flames.

Both yield and quality of the carbon black produced in such a burning shed are dependent upon many factors over which the operator at present has but partial control. The best flame shape, which is regulated by the burner tip design, and the best distances to the collecting surface and to other tips, have been established after long experimenting with each different gas supply. Drafting of the building is done only by experienced men who have learned to know the best color of the flame and the proper appearance of the smoke for optimum production and quality.

Conditions within a burning shed change with every mood of the weather. Drafting effects are different at night

WESTCOTT VALVES



FLEXIBILITY — a Westcott installation handling 185,000,000 cubic feet of gas per day at 200 pounds gage, with flexibility for a maximum capacity of 250,000,000 cubic feet at 250 pounds gage — the largest Orifice Meter station in the world, in service for the Arkansas Natural Gas Corporation at Sterlington, La.

WESTCOTT VALVES

J627A

Manufactured by the Westcott Valve Company, East St. Louis, Ill., manufacturers of products for the Oil and Gas Industries exclusively. Full stocks carried in East St. Louis and all stores of the Continental Supply Co.

When writing WESTCOTT VALVE CO. *please mention The Petroleum Engineer*

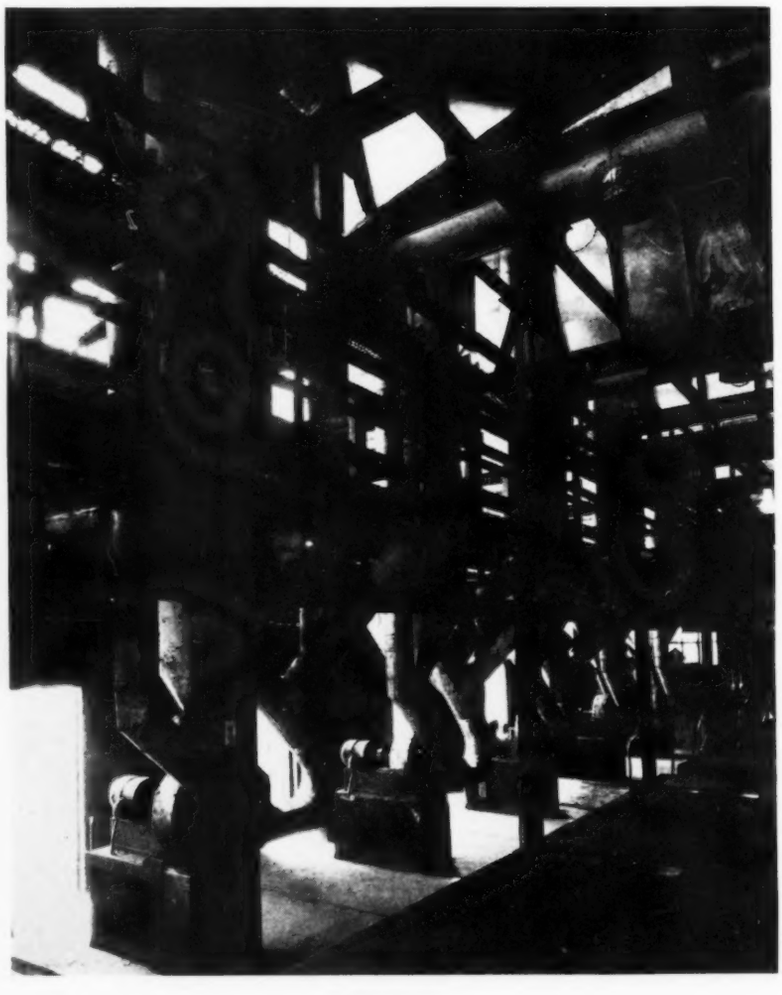
than in the daytime. Winds upset the drafting control seriously. They also cause the flames to flicker, thereby depositing less carbon. Heavy storms and cold snaps not only hamper control, but also cause mechanical disturbances, resulting in grit and rust getting into the product.

Air view of carbon black plant.

Adjustments of the shed controls to meet every changing weather condition would keep a large crew of men busy continuously. No successful system of automatic drafting control applicable to channel plants has been put into operation. Only scattering efforts to eliminate variations in weather and gas supply have as yet been made, in view of the probable cost entailed. It is, indeed, customary, especially with cheap gas, to set the drafts and other controlling features empirically to meet the average seasonal conditions.

The mysterious features of the industry belong chiefly to the producing end of the plant. We find that in the packing house the raw carbon black is subjected only to a series of definite mechanical processings. It has been cooled sufficiently in transit that little fire hazard or likelihood of chemical change remains. The first step in the packing house is to separate the light and finely divided carbon from the coarser grit and heavier impurities. This is followed by various combinations of steps in condensation of bulk and packing.

Originally, the separation was effected by passing the conveyor material through bolting screens under rotating brushes. This method served its purpose (to remove large foreign objects) during the early days of the industry, when particle size and grit content were only crudely considered. There was no particular objection to a residue of 1 per cent on a 40-mesh screen. However, urged by stiffening requirements of the trade, and consequently allowed by improved operation and purity of the normal product, the use of brush-screen bolting passed into the limbo of the unfit. Two methods of bolting are in current use in the industry—air flotation to remove all heavier particles, and grinding with high-speed knives to reduce all material to the specified fineness. The limit retained on a 100-mesh screen varies from one to five parts in ten thousand. This specification is met more readily by the grinding process, although advocates of air bolting claim that the removal of coarse particles, which are of considerably inferior quality, lead to a superior product chemically.



Air separators.

The condensation of carbon black to a reasonable bulk for packing and shipping is an important item in its preparation for market. One cubic foot of the raw material from the conveyors weighs only 2 to 3 pounds. Packed material for the trade contains 25 to 30 pounds per cubic foot. The entrained air in the carbon black mass is difficult to remove. The bolted material is first stirred slowly for a period of hours in large tanks until it has thoroughly settled. It is then packed into heavy kraft paper bags under the feeding pressure of a rotating cut flight spiral. The bags, each containing 12½ pounds of carbon black, are then compressed to the final density in specially designed hydraulic or mechanical presses. They are finally overslipped with shipping bags.

Heating Coil Increases Capacity *of* Rerun Still

By T. A. POMEROY, *Refinery Superintendent Texas Pacific Coal & Oil Co.*

THE pipe still is generally accepted as the most efficient type of equipment for rerunning pressure distillate, due to its economical cost of operation and the quality of the product.* A shell still installation at the Wynnewood refinery of the Texas Pacific Coal and Oil Company was changed so that the operation is similar to that of a pipe still. This has resulted in an increase in capacity from approximately 600 to 1,000 barrels per day in throughput.

This rerun still consists of a 14 by 40-feet shell still equipped with a ten-plate bubble tower, which is 6 feet 6 inches in diameter. The still is used to rerun pressure distillate containing from 60 to 65 per cent of gasoline.

During the past five years the operation was as follows: Cold pressure distillate (70 to 90 degrees F.) was charged continuously into the tower on the second tray from the top. Fire was applied to the shell of the still to maintain an oil temperature of approximately 400 degrees F. A 24-inch oil level was maintained in the shell still by pumping out continuously. This reduced oil had a gravity of from 30 to 32 A. P. I. Inside the still near the bottom was installed a steam spray which equally distributed the steam to keep the oil agitated on the fire sheet. Steam was admitted through a 2-inch valve from a line carrying a pressure of 100 pounds per square inch. Six spokes of steam were used in the operation. The pressure distillate charged to the tower acted as its own reflux and the end point of the gasoline produced was maintained by raising or lowering the still temperature.

Changes Increase Capacity

To increase the capacity and efficiency of the unit a 100-foot coil of 4-inch pipe was installed in the bottom of the still. The pressure distillate is pumped through this coil and preheated to a temperature of approximately 200 degrees F. and then admitted to the fourth tray from the top of the tower. A super-heat steam coil was also placed in the fire box. This was made of 2½-inch extra heavy pipe. The operation is carried on as before, maintaining a temperature of 355 degrees F. on the oil in the still. This operation requires less super-heat steam (450 to 500 degrees F.) and increased the capacity to nearly 1,000 barrels per day.

The decrease in still temperature produces a gasoline having a better and more stable color than before. The super-heated steam and the higher temperature of the feed to the tower increased the throughput, requires less steam per barrel of oil charged, and does not require any additional condensing capacity on account of this decrease in steam consumption. Charging hot oil to the tower requires cold reflux on the top tray to control the end point. This was accomplished by running a 1-inch line from the discharge of the pressure distillate charging pump to the top of the tower. As the operation is very constant a small stream of cold distillate controls the end point nicely. The following table shows the results obtained by the changes in the unit:

	Bbl. P. D. charged per day	Fuel consumption	Loss	Steam used	Stream tempt.	Left in bottoms at 410 Hempl	St'll tempt.
Before changes to still	550 to 650	2.8 to 3.2%	4 to 5%	6 spokes wet	80 to 110	1 to 3%	390 to 410
After changes were made	900 to 1000	2.0 to 2.4%	3 to 3.8%	5 spokes super-heated	80 to 110	0 to 1%	355

*C. M. Ridgway, The Petroleum Engineer, April, 1930.

Aerial view of the Texas-Pacific Coal & Oil Co. refinery at Ft. Worth, Texas.—Courtesy Texas Flying Service, Inc.

NOW *for* HEAVIER DEEPER DRILLING·

Modern deep drilling has introduced longer runs of larger casing, but with approximately the same diameter drill string. The greater clearances between casing and string present opportunities for severe whipping and abuse. But the new OVERSIZE BETTIS PROTECTOR, with its greater surface area and thicker all-rubber wall, cushions these heavier blows and tendencies toward vibration. Correct circulation areas are maintained. Like the standard Bettis Protectors and Drill Stabilizers, this new Oversize Protector is a big ring of the toughest rubber known. No knobs, metal, pins or other gadgets are used.

The oversize Bettis Protector is slipped onto the drill pipe without special tools. Easily manipulated below the surface with the overshot in case of twist-offs.

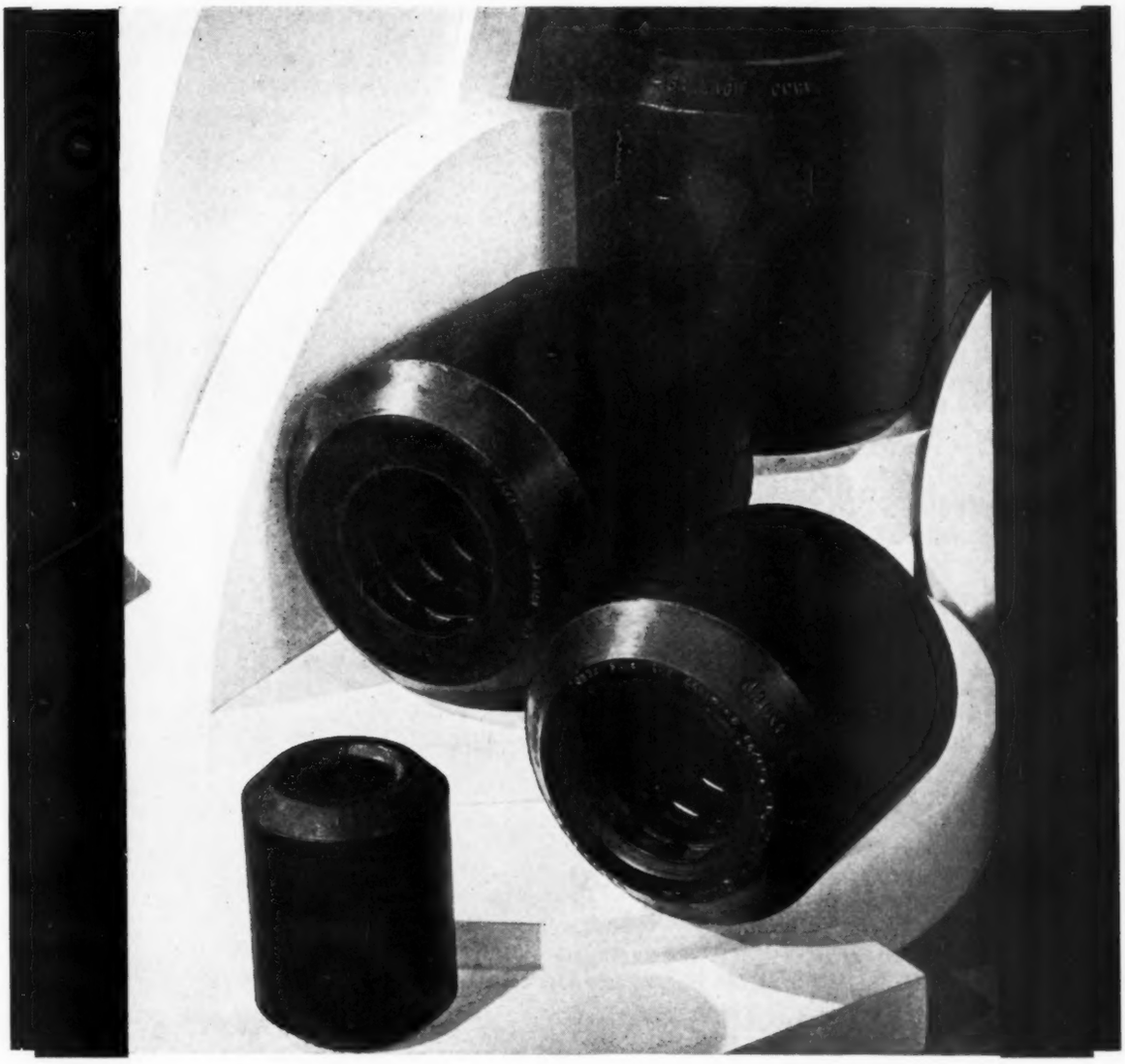
Patterson-Ballagh Corporation
Insurance Exchange Building
Los Angeles

Texas and Gulf Coast Distributors
BETTIS SALES CO., 917 Merchants and Manufacturers Building, Houston
Oklahoma Distributors:
BAILEY & BECKER COMPANY, 410 Thompson Building, Tulsa
New York Office: 39 Cortlandt Street

Carried in stock at Los Angeles, Ventura, Kettleman Hills, Bakersfield, Coalinga and Long Beach, California. Tulsa and Oklahoma City, Oklahoma. Houston, Texas. Hobbs, New Mexico. Calgary, Alberta, Canada. New York City.

When writing PATTERSON-BALLAGH CORP. *please mention The Petroleum Engineer*

OVERSIZE



Fully Patented

"Best bet yet-i"

ELIMINATING HAZARDS *in* Natural Gasoline Operations

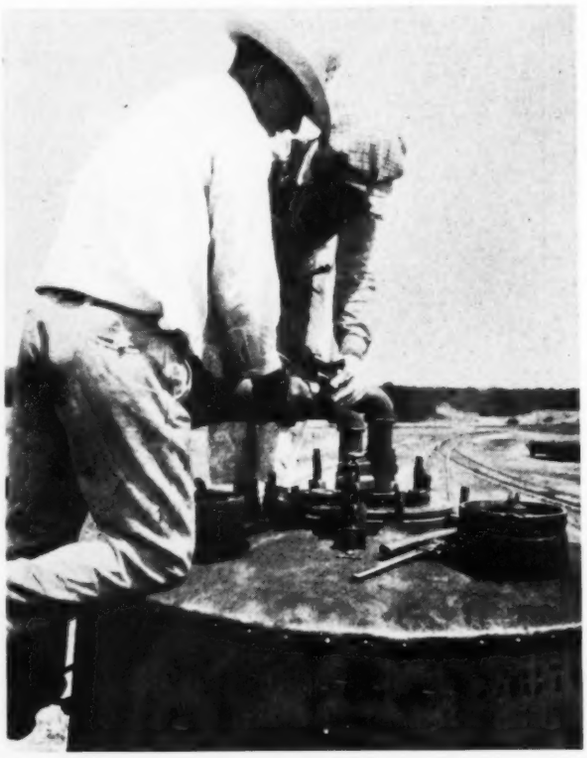
By H. N. BLAKESLEE*

INCREASING attention to the study of accident prevention methods in the natural gasoline industry has come as a matter of necessity. Experience is often a hard teacher, and experiences prove that accidents in this industry are likely to be quite serious. Also, they are apt to be quite costly. Likewise, the occurrence of such accidents is coming more and more to be associated with inefficiency of management.

Conditions may exist, or develop, where accidents in operations may seem almost inevitable. Yet an impartial investigation will usually prove that the conditions which represented the accident hazards could have been prevented. In other words, the accident hazards were the result of conditions which a higher degree of plant efficiency and safety precaution would not have permitted.

An accident occurs when something goes wrong. An accident may injure a workman, damage machinery or burn down a building. An accident used to be explained frequently as "an act of God." But modern construction in the natural gasoline industry provides for structures that lightning cannot set on fire and that wind cannot blow down. So the explanation of an accident as "an act of God" is steadily becoming more and more out of date.

Engineering in natural gasoline plants has not reached perfection, and neither have operating methods. However, engineering has resulted in the improvement of plant layout and has removed many accident and fire hazards. Alert superintendents in these days are definitely instructing their operators in the safe management of their plants. These superintendents request that their operators furnish them with information on plant situations that might develop into fire and accident hazards.



Special tank car dome cover to prevent loss of natural gasoline vapors.

It is still true that accidents may result from mechanical failure. But up-to-date engineering and exactness in construction always provide an extra strength for maximum loads as a factor of safety. However, we must always take into consideration the acts of workers. The best of equipment, with every element of safety, may go wrong if the workman fails to operate the equipment as was intended by the designer.

This may be illustrated by an accident which occurred in a natural gasoline plant recently constructed. The operator of the plant heard a noise and discovered that a tank into which natural gasoline was flowing from a rectifier had ruptured and the contents were rapidly flowing down a gulch toward the living quarters of the camp help. The boiler fires were immediately extinguished, and all persons in the community were notified to get out. It was some time before the flash came, but it did come. It is possible that the vapors from the gasoline flowing down the gulch may have been ignited by a light in the living quarters. At any rate the explosion came, and one man lost his life.

In this case an individual had failed. Somebody had permitted the tank to become overfilled. The gasoline had backed up in the line to the rectifier, which permitted the pressure from the rectifier to surge into the storage tank and cause it to burst. The accident proved that in this case neither the engineering practice nor the plant operation had reached perfection.

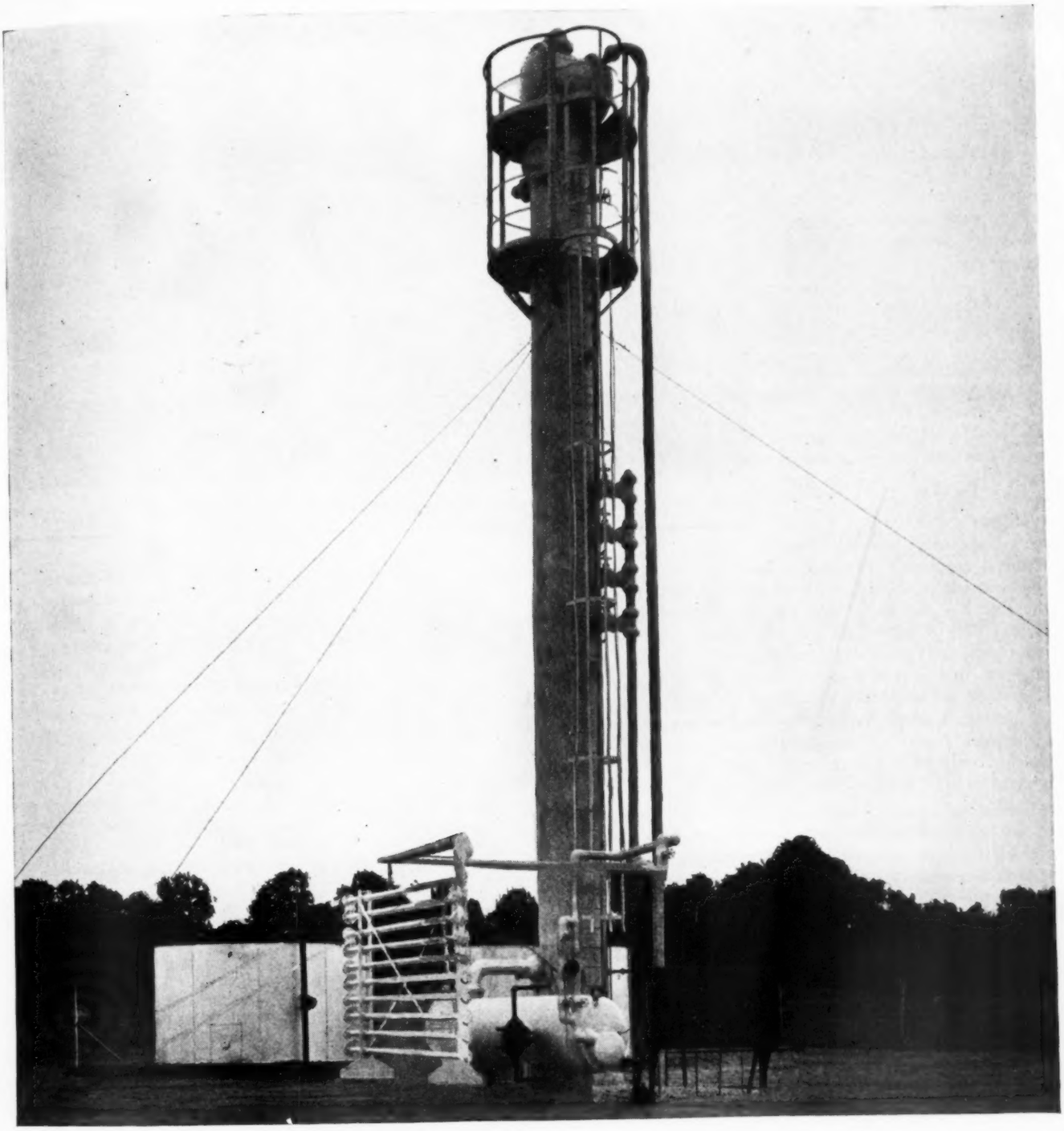
A number of fires and explosions have occurred in the operation of natural gasoline plants, and it is probable that the presence of a flame or spark caused all of them. In one instance a laborer was burned to death on a pipe line repair job as a result of the ignition by a lighted lantern of gas which had accumulated in the excavation where the repairs were being made. This accident emphasizes the necessity of using only vapor-proof flashlights on pipe line repair jobs.

Safety programs in natural gasoline operation are conducted at some disadvantage because of the fact that it is a comparatively new industry. Even as recently as fifteen years ago few people realized the possibilities of the increased revenue from utilizing the moisture extracted from natural gas as it comes from the wells, after commercial developments had proved that this natural gas, when freed of its moisture, was a much better fuel and easier to handle. Thus the natural gasoline industry was born of necessity to prevent waste in the production of natural gas and crude oil.

Since the extraction of natural gasoline is a comparatively new industry, there have been chances for many mistakes, some of which have been quite costly from the viewpoint of revenue and also from the viewpoint of accident costs.

For example, I am reminded of an experience which came to my attention in 1929, at which date I rejoined the

* Petroleum Representative, National Safety Council.



A TYPICAL INSTALLATION OF
TULSA TYPE FRACTIONATING EQUIPMENT

TULSA, OKLAHOMA
2020 South Union Street

TULSA

OKLAHOMA CITY, OKLA.
443 Commerce Exchange Bldg.

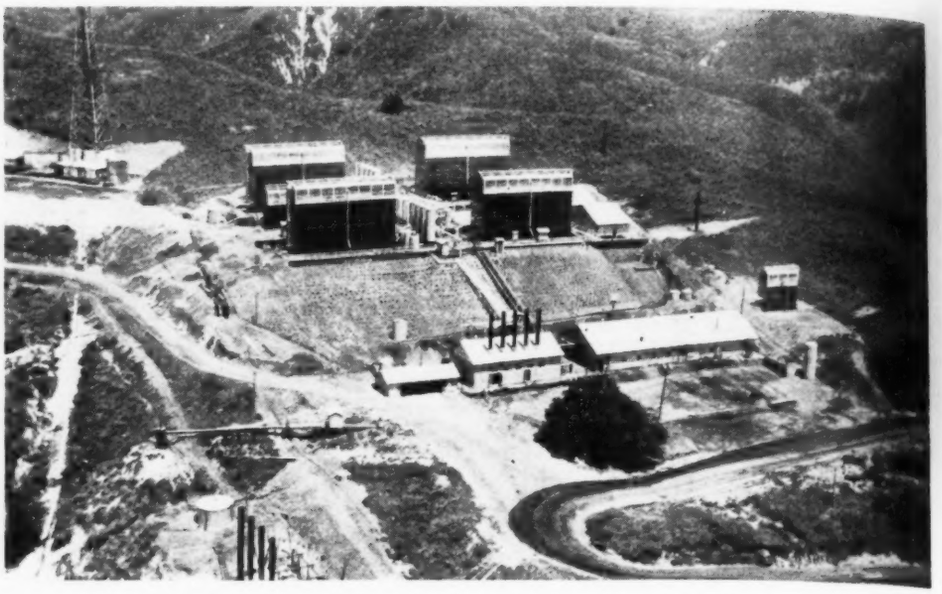
Boiler & Machinery Co.

TULSA, OKLAHOMA

NATURAL GASOLINE PLANTS TANKS REFINING EQUIPMENT

When writing TULSA BOILER & MACHINERY CO. *please mention The Petroleum Engineer*

oil company for which I had been working before the war. One of the new projects which I visited at that time was the construction of a natural gasoline plant. I well remember going with the general superintendent of the producing department through the new plant while it was under construction. I was impressed by a mistake that the lease superintendent had made. The ditch had been dug for a wet gas line from a booster station to the main gas plant and it followed the surface contour. This was in Buena Vista Hills of the Midway field in California, and it is easy to appreciate that there were a lot of high spots and a lot of low spots in the line.



Natural gasoline plant in the Ventura avenue field of California.

It had not occurred to the lease superintendent that casinghead gasoline would accumulate in the low spots in the line, causing in the line a series of liquid locks. Fortunately, the line had not been laid and it was possible to reroute it and thus to eliminate the low spots. This incident is mentioned only to show how easy it is to make mistakes on work that is new to us. Natural gas from the well had been used for lease fuel for years, and the principal source of trouble in using it had been the locking of the lines by condensed liquid. Consequently, this mistake could be charged only to a failure on the part of the lease superintendent to give due consideration to this new piece of work.

There has been a gradual development of the realization, in the natural gasoline industry, that revenues may be increased through the prevention of accidents. This interest is well illustrated by the experience of the Petroleum Section of the National Safety Council, through the petroleum safety contests which have been conducted during the past two years. The petroleum companies which are competing are divided into six different departments, with "natural gasoline" as one of them. The records of this department have been further segregated into six geographic divisions.

Regardless of the natural hazards of this part of the petroleum industry, the natural gasoline department has made an encouraged accident prevention record, as compared with the other departments. In the 1928 accident prevention contest the natural gasoline department was the leader among the six divisions, with an accident frequency rate of 14.94 accident per 1,000,000 man-hours of work. The other departments ranked as follows: Manufacturing, 15.75; marketing, 17.37; marine, 19.60; and producing, 40.19.

In the 1929 accident prevention contest there was a large increase in the number of competing organizations, including a number of companies that had given little previous systematic attention to safety work. As a result, the natural gasoline division dropped to fourth place among the six departments with an accident frequency rate of 25.90. This rate, while considerably higher, was really not much in excess of an average rate of 24.79 for all departments in the contest. In this contest the marketing, manufacturing and marine departments ranked above the natural gasoline department.

The 1930 accident prevention contest has been showing very good results, as compared with both the 1929 contest and the 1928 contest. Figures recently compiled for the first five months of the 1930 contest indicate that the natural gasoline department has an accident frequency rate of 11.76. This rating places this department in second place among the six departments of the petroleum industry. The natural gasoline department, for this five-month period, is outranked only by the marketing department.

The problems in the prevention of fire and explosions in natural gasoline plants may be classified under the following three main divisions:

1. Preventing gas leaks.
2. Keeping sparks or flame out of the possible gassy area.
3. Adequate ventilation to dissipate gas that may escape and otherwise form a combustible mixture.

Gas and gasoline vapor, as the chief hazards in natural gasoline operation, are invisible high-power explosives which demand the utmost precaution. Following are suggestions for the observation of these precautions.

a. Keep all gas compressor packing glands adjusted to prevent leaks.

b. Magneto wires should be securely fastened so they cannot jar loose and cause an ignition leak and create a spark.

c. Magneto terminals should never be removed to stop an engine or while the engine is running. A spark of sufficient strength to ignite combustible vapors may result between the terminal and the spark plug or between the terminal and the base of the engine.

d. The preceding instruction holds true in attaching magneto terminals to a gas engine in motion.

e. Keep a constant check for gas leaks on all gates or valves, cylinder gaskets and line fittings.

f. Where it is necessary to place boilers at all near gas compressors a fire wall should be built to divert away from the boiler fires any gas that might escape from the compressors.

g. Use only vapor-proof electric lighting equipment, such as vapor-proof globe covers, wiring in conduit, etc.

h. Install all switches and fuse boxes, even though vapor-proof, outside the compressor room.

i. Provide ventilation that will remove the gases that may accumulate, and especially the heavy gas, from near the floor.

"See American First"

A Separator Should *Not* Be— *Like a Percolator!*

Some people believe that an Oil and Gas Separator should be built on the principle of a Percolator.

The Improved AMERICAN Oil and Gas Separator *is very much UNLIKE* a Percolator. In a Percolator the water is constantly mixing with the coffee, which absorbs it. The Improved AMERICAN Separator is purposely constructed so that once the oil is stripped from the gas *it is never given the chance to mix again.*

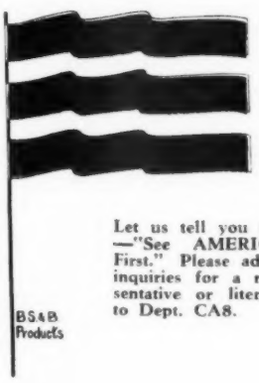
The result, 100% dry gas, which the gas lines want and 100% of the oil stripped from the gas, *which you want!*

The Improved *American* Oil and Gas Separator

Equipped with B. S. & B. Spray Condenser

Thus a principle of this Improved AMERICAN Separator, made possible by the B. S. & B. Spray Condenser. A greater salvage of oil in addition to the greater capacity of extraction made possible by the oversize inside float, which has the power of ten ordinary outside controls. "A man to do a man's job."

There are other points worth knowing—the Inside Tangential Inlet; the elimination of many outside fittings, so that the Separator can be rolled like a barrel in transportation, handling and otherwise. This model was not built on conjecture, but *engineered.* It has been thoroughly tested under actual working conditions in the field.



Let us tell you more —"See AMERICAN First." Please address inquiries for a representative or literature to Dept. CA8.

American Tank & Equipment Corp.
A SUBSIDIARY OF
BLACK-SIVALLS & BRYSON, Inc., Bartlesville, Okla.
OKLAHOMA CITY — OKLAHOMA

Formerly AMERICAN TANK COMPANY

Standard Company Has Model River Terminal in Arkansas

SOME years ago when the famed Smackover (Ark.) field was belching its viscous production to crowd transportation facilities to their limit, the Standard Pipe Line Co. built a 90-mile, 10-inch screw line due east to the Mississippi River and handled a great tonnage of the oil by the dual method of a pipe line and barges to move the oil to the Standard Oil Co. of Louisiana, Baton Rouge refinery. This method of transporting oil a distance of 300 miles is one of the most economic in the nation because of the low cost of moving it south from the line's terminal.

Crude is delivered by the pipe line company to the Standard Oil Co.'s storage at the Grand Lake terminal. A steam station at the terminal pumps the crude to barges and also handles the gasoline and kerosene shipped up the river in barges to Grand Lake for distribution in Arkansas and North Louisiana.

The station at Grand Lake has seven 16 by 14 by 24 side-pot, low-pressure pumps with a rated maximum delivery of 12,500 barrels hourly against a line pressure of 112 pounds. All of the stations along the line are steam plants, and intermediate steam heating plants are spaced in between to raise the temperature of the heavy oil whenever necessary to pump a large volume during the winter.

At the Grand Lake terminal the pumps are driven with steam generated in the nine 150-horsepower Scotch marine type, dry back, oil-burning boilers. Both the boiler and pump houses are frame and sheet iron construction. The two buildings are separate, but laid out in an L shape. The station office is connected to the pump house and in the same building is a small warehouse where small parts are stocked. Cottages for the pipe line employes are on one side of the site and the producing company's cottages are on the other side.

The boiler plant requires two boiler feed pumps and a cold water pump delivers water from the wells to the overhead water supply tank. Before going to the boiler the water passes through a feed water heater which is operated by exhaust steam. It reaches the heater at a temperature of around 72 degrees and goes to the boilers at a temperature of around 200 degrees.

Virtually all of the auxiliary equipment is housed in the boiler house. Two 10-K. W., 125-volt steam turbine-driven generators develop current for general lighting of the station buildings and flood lights. One of these operates at 4,000 r. p. m. and the other at 1,800 r. p. m. Air for station use and to flow the drinking water wells is compressed by a 6 by 6 by 6 air compressor.

Very little steam at the station is lost without doing double duty. Exhaust steam is used principally for heating purposes, in the feed water preheater, to heat the station and raise the tem-

Top to bottom—Interior of boiler house. Exhaust steam line to tank. General view of docks.

perature of the oil during the winter months. Each of the seven 55,000-barrel capacity crude oil storage tanks is equipped with heating coils.

The tanks are arranged on either side of a road running between them, four on one side and three on the other. The exhaust steam line is insulated and is suspended overhead from steel poles made from used pipe and set in concrete. The line is suspended from a cross-arm and turnbuckles are used to level it. Lateral lines extend down and over to the tanks, and by a valve arrangement steam may be shot into the tank in the event of fire.

Approximately 1,400 feet of pipe is used in the construction of the welded coils in each tank and set on a foundation eight feet up from the bottom of the tanks. The condensate of the exhaust steam is carried off through a 2-inch drain line which goes through the fire wall to drainage ditches.

With this method of heating oil its temperature may be raised to 110 degrees. In actual operation, however, the temperature is raised to around 80 to 85 degrees and held there. Usually the practice is to heat the oil the day before a barge shipment. The station crew is informed daily of tugboat movements and is advised a day or so ahead of time when a tug with its tow is expected to dock.

Two 16-inch lines, one on either side of the road between tanks, extend to the pump station manifold. The oil is discharged through two 12-inch lines to the docks, approximately half a mile distant. When pumping, the station is able to deliver near its maximum capacity for a relatively short while because the suction pressure falls as the tank being pumped is emptied.

All of the lines extending from the station docks are laid on a long trestle extending from the levee to the water's edge. The foundation for the trestle is treated piling and most of the piling used in building the dock is spliced. As a protection against fire in the timber, thick in the bottom land, laborers at the station keep the clearing for 25 feet on either side of the trestle free from weeds and long grass.

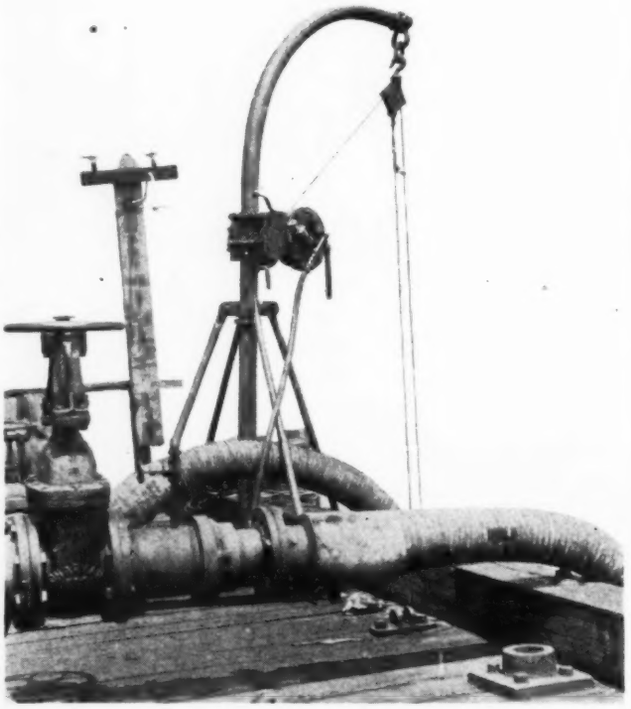
Six lines were laid on the trestle, three on each side of the walk in the center. On one side is a 4-inch insulated steam line, a 12-inch oil line and 8-inch gasoline line. On the other is a 6-inch kerosene line, 2-inch combination water and air line and the second 12-inch oil line. Each line is painted and has expansion joints at relatively close-spaced intervals to care for contraction and expansion. Telephone and electric wires are carried to the docks on the trestle.

The two 12-inch lines are, of course, used to load the barges. Because kerosene and gasoline are handled separately, two lines were required to move these refined products from the barges to the terminal. The steam line serves two purposes, but primarily is used for the pumps on each of the gasoline and kerosene barges. As soon as the barges are tied to the dock and connections made the pumps are started and discharge cargo in the barges while the crude oil barges are being filled. The steam at the dock is also used to power a large winch which is used to pull driftwood away from the docks during the high water stages. The combination air and water line is primarily an air line for operation of the air-motor-driven davits which are

Top to bottom — Refugees on barge. When "Old Man River" started creeping up on station. Gaugers at work during flood.

used to swing the hose connections from the dock to the barges. In case of fire along the docks, this line is used as a water line. Reels of hose are stored in a small house at a midway point on the trestle, along with hand extinguishers and axes.

Little time is lost at the docks in unloading a shipment of refined products and filling the empty crude oil barges. Everything is in readiness at the docks when the tugboat arrives with its tow. As soon as the barges are maneuvered to the docks and made fast, the hose connections are dropped over the side of the docks to the barges. When they have been flanged up, orders are telephoned to the station to start the pumps, and as the barge is nearly filled orders are telephoned to the pump station to throttle down the pumps. The engineers keep a close watch on the pressure gauges and shut down the pumps when the pressure starts rapidly climbing.



Close-up of davits and hose connection.

The dock is approximately 25 feet higher than the usual river stage, which permits barge movements to continue during high water periods. The water around the dock is 45 feet deep at low stage.

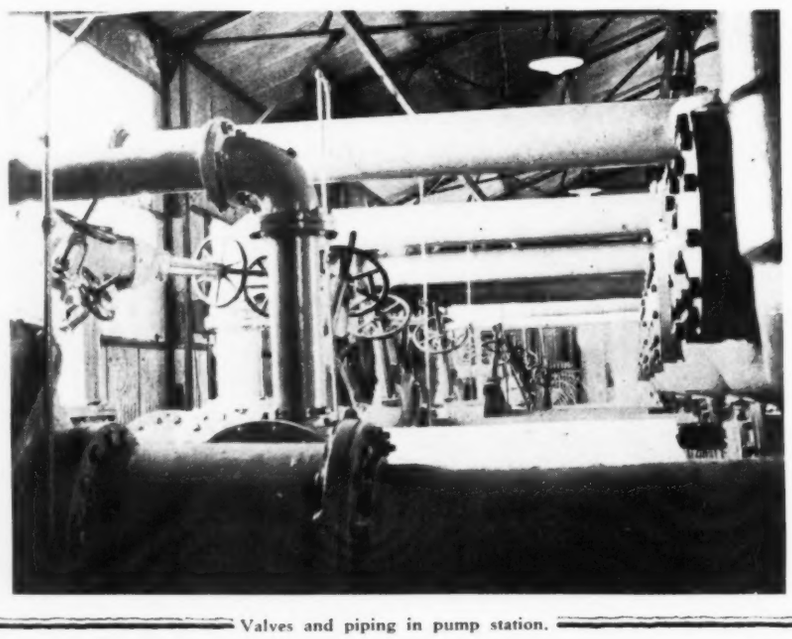
What is probably a record that will stand a long time was made when the *Sprague*, the largest inland towboat in the world, took a tow of 19 barges containing nearly 247,000 barrels of crude oil down the river to the Standard refinery at Baton Rouge. It required 53 hours for the tug to shove its string of barges downstream through the treacherous waters of the Mississippi.

All of the newer barges are all-steel in construction and the largest have a capacity of 17,000 barrels. When loaded the barges draw approximately nine feet of water, as do the tugboats. On both the upstream and downstream trips the tugs shove their tow ahead of them to better handle the string of barges in narrow passes, shallow water or in dodging snags.

During the last disastrous flood the tugboats and empty barges were pressed into service to play an important role in relief work, as they usually play whenever such emergencies arise. Frequently the barges and tugs offered the only transportation of material and laborers to rush to a weakening levee. Other times they were used to gather refugees and transport them, along with a few personal belongings, to safety.

While the tugboat crew is working long hours in relief work, at such times the terminal crew likewise misses hours of sleep. At these times there are always large rafts of driftwood swirling down the river, and when these swirl around the piling guards and crash into the docks it is a problem to break the jam before it sweeps away the dock, or a part of it. During the last big flood part of the dock was swept away. At the same time the station site was flooded and the gaugers went about their tasks in boats.

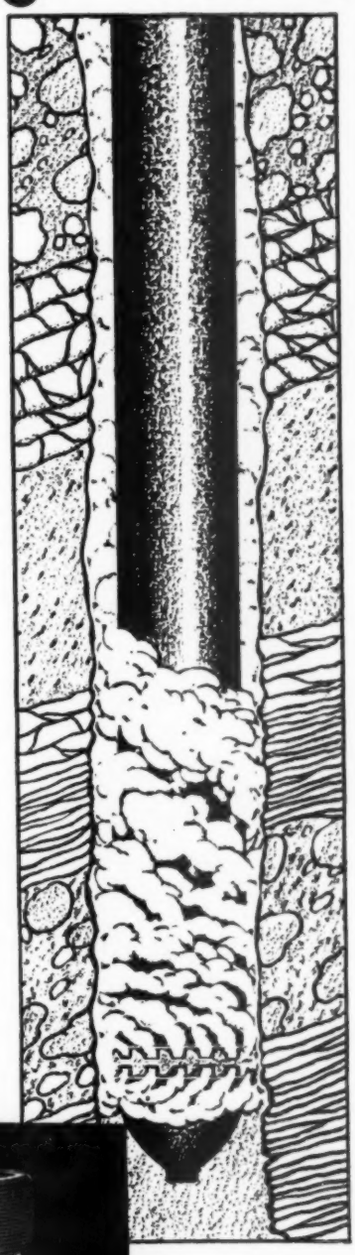
Packing of the pumps is probably the most serious operating problem at the terminal. This requires frequent repairs to each pump, especially the gasoline and kerosene pumps. This work, however, is done when the pumps have been shut down after loading a shipment, and consequently there is no "shutdown" charge for time lost against the station. Other than these repairs and periodical inspection of equipment the station's maintenance problems are down to a minimum cost.



Valves and piping in pump station.

IF• • •

you could rotate the casing—cement would not "channel"!



BAASH-ROSS

CENTRIFUGAL CEMENTING GUIDES or COLLARS produce the same results!

A ROTOR turning freely over a series of holes in the body ...cement forced against the vanes producing rotation ...result...cement whirled out in a uniform, continuous stream that washes the walls of the hole clean and fills every opening.

Boulders and obstructions can't stop this continuous, uniform flow...no channels can be left...out of many test jobs with this tool *every one secured a complete shut off.*... Bulletin 81 gives more particulars!

BAASH-ROSS TOOL COMPANY

5512 Boyle Avenue » » » Los Angeles, California

EXPORT DEPARTMENT
New York . 30 Church Street

DISTRICT OFFICES
Houston, Texas . 1816 Nance St.
Oklahoma City . 1559 East G St., Capitol Hill

•

24-hour field shop and supply service at
LONG BEACH - BREA - TAFT
VENTURA - OKLAHOMA CITY

J&L PIPE B-R

Regular Pattern Baash-Ross Centrifugal Guide—here illustrated—and Cementing Collar distribute the cement horizontally. The Special Pattern distributes at a 45-degree angle toward the bottom of the hole. All three insure every cement job against "channeling"

BAASH-ROSS TOOL COMPANY
Box 1297 Arcade Station, Los Angeles, California

Please send me—no charge or obligation—Bulletin 81 describing the Baash-Ross Centrifugal Cementing Guides and Collars.

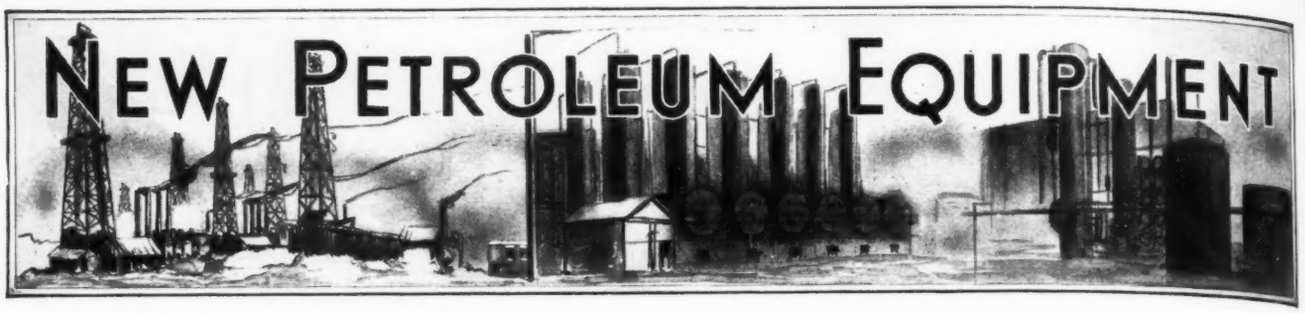
*Name*_____

*Company*_____

*Address*_____

Petroleum Engineer, Sept. 1930

When writing BAASH-ROSS TOOL CO. *please mention The Petroleum Engineer*



International Filter Moves

THE International Filter Company and associated companies, International Water Softener Company and General Zeolite Company, announce that expansion of their manufacturing facilities required the removal of their offices and engineering departments from Plant No. 1 at 333 West 25th Place, Chicago, to larger quarters covering the 13th and part of the 14th floor of the Buckingham Building, 58 E. Van Buren St., Chicago.

New Protector Lengthens Casing and Tubing Life

Baash-Ross tubing and casing protector on standard A. P. I. coupling.

AFTER a year of research in co-operation with California oil companies, a casing and tubing protector in which a smooth bronze sleeve forms the contact between coupling or tubing and casing has been placed on the market by the Baash-Ross Tool Company. In one type the bronze protector is applied to the standard A. P. I. coupling with a press fit, without altering the coupling in any way. In the other type, for application to earing points on the tubing itself, a split steel grip ring which slips over the tubing is provided with a male, and the bronze protector with a female thread. Tightening the two together by means of a spanner wrench holds the protector rigidly in place.

Details of this new protector are given in Bulletin 79, which may be secured from the company at Box 1297, Arcade Station, Los Angeles.

New Headley Coatings on Market

THE Headley Emulsified Products Company, Franklin Trust Building, Philadelphia, Pa., has placed two new coating products on the market.

Headley asphalt-base aluminum is a coating composition for application over steel, iron and other metals, concrete, wood and fabric for the prevention of corrosion, disintegration and destruction from the action of moisture, acids or alkalies, chemical fumes, salt air, etc.

The ingredients are aluminum flake and pure refined Mexican asphalt with only enough volatile solvent to produce a good brushing or spraying consistency. This new product is described in the company's bulletin No. 430.

Headley emulsified asphalts for waterproofing, dampproofing and general protective coating are described in bulletin 330. This product consists of selected grades of straight steam-distilled Mexican asphalt in emulsified form. The emulsifying agent is a special soap product adopted after exhaustive tests in the laboratories and in actual service.

New Electric Controller Brake

THE Electric Controller & Manufacturing Co., Cleveland, Ohio, has introduced a new WB brake which, it claims, offers ease and accessibility of adjustment. The braking torque adjustment is on top—easy to get at. For equalizing shoe clearance, a single screw takes care of both shoes. This adjustment is made when the brake is mounted, and rarely needs to be disturbed.

As the brake shoes wear, the air gap between magnet and armature increases and needs to be corrected from time to time.

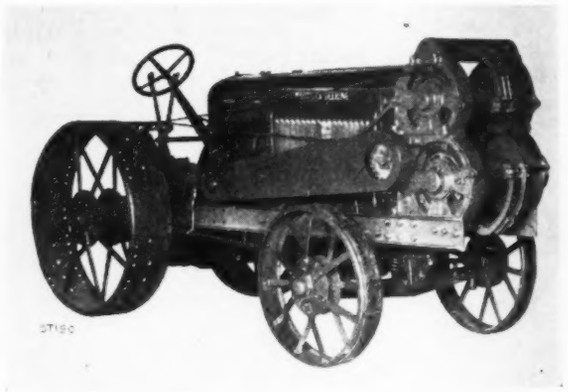
Type WB brakes are available for mechanical as well as electrical operation. Bulletin 1004-AF completely describes both types and shows many interesting installations on cranes and mill drives.

New Model Trackson Hoist

THE Trackson Co., Milwaukee, Wis., announces a new model Trackson Hoist, the "HM," which is designed for mounting on the 15-30 McCormick-Deering tractor. It is essentially a heavy-duty machine, built for general, all-around hoisting usage and for hard, continuous service.

The "HM" model Hoist has greater cable capacity, improved screw-type clutches, oversized drum shafts, hand lever control and a level wind device that is said to wrap the cable on the drum evenly and smoothly, layer after layer.

The model "HM" may be obtained either as a single or as a double drum hoist and can readily be converted into the other type by merely mounting or removing the upper drum. Also, the hoist can be purchased as a separate machine, or it



can be ordered as a complete unit mounted on the 15-30 or Model 30 tractor. Installation on the tractor is an easy matter, since there are no holes to bore and no construction changes to make. The hoist is mounted by means of six-inch steel channels which extend from the front of the unit back to and around the tractor rear housing.

The patented exclusive Trackson level wind prevents the cable from criss-crossing or bunching up as it is wound onto the drum. It can be adjusted for various sizes of cables.

New "Oilwell" Three-Jaw Double Die Tubing Tongs

THE Oil Well Supply Company announces the construction of the new three-jaw double die tubing tongs. The construction of the jaws and the arrangement of the dies are features of the tongs. The inside of the jaws is machined and reamed accurately to size to give a perfect fit around the tubing. Extra large steel pins are used in connecting the jaws, as well as the handle, and it is claimed they prevent sagging or misalignment of the jaws.

Two tool steel dies are used, one in the back jaw and one in the front jaw, both of which are engaged when the

jaws are closed and the tongs in operation. This feature makes for a positive grip. Die set screws have flat heads for removal with wrench and the screw holes are centered in the dies, giving full service on four die cutting edges.

The makers claim the tongs are well balanced, light in weight but powerful, making them easy to handle. There are no triggers, springs or gadgets to wear quickly.

The new Oilwell three-jaw double die tubing tongs are made in the 2-inch and 2½-inch sizes and weigh 18½ pounds and 22 pounds, respectively.

New Acetylene Plant in Casper, Wyo.

THE Prest-O-Lite Company, Inc., 30 East 42nd St., New York, N. Y., has placed in operation a new plant for the manufacture and distribution of dissolved acetylene at Casper, Wyo. The new plant has been built to accommodate the increasing need of users of the oxy-acetylene welding and cutting process in this region. The plant is located on a private siding of the Chicago, Burlington and Quincy Railroad, and the address is 648 Bryan Stock Trail, Casper, Wyo.

New Electric Brazing Equipment

THE General Electric Company, Schenectady, N. Y., announces a new line of electric brazing equipment. Brazing with this equipment is accomplished by heat generated by the flow of electricity through carbon blocks. As these blocks offer high resistance to the flow of electricity, the heat generated is correspondingly high and but small pressure is needed to complete the joint.

The equipment consists of a transformer, foot switch and tongs for holding the carbon blocks and work. The sizes of the various parts depend on the size of work to be handled and joints to be made.

Special Dies for Brass Pipe

THE Borden Company, Warren, Ohio, announces that it will now carry in stock dies for all sizes of Beaver tools, specially ground for threading brass pipe.

For easy identification, these dies will be copper plated, and stamped "For Brass Pipe."

No extra charge will be made for these special dies and they can be obtained through all local supply houses.

Ac-me Gas Cleaner Rights Acquired

THE Blaw-Knox Company of Pittsburgh, Pa., announces it has acquired the sole manufacturing and sales rights of the Ac-me Gas Cleaner, formerly manufactured, under license agreement with the Empire Oil & Refining Company, by D. A. Sillers at Dallas, Texas. The name of this unit will be changed to the Blaw-Knox Gas Cleaner.

The major underlying principles of the Ac-me Gas Cleaner were developed by engineers of the Empire Oil & Refining Company and Doherty Research Corporation of Bartlesville, Okla. Additional improvements were made by Mr. Sillers, superintendent of gas measurements, Lone Star Gas Company, Dallas.

An illustrated bulletin describing general operation and performance of the Blaw-Knox Gas Cleaner is available and will be sent without obligation.

Prescott Announces New Slush Pump

THE Prescott Company, Menominee, Mich., has placed on the market a 7-inch by 20-inch piston type, duplex double acting, power driven slush pump, direct connected by means of a Fast coupling to a 225 H. P. Westinghouse steam turbine.

The normal speed of this pump is 45 revolutions, and any form of motive power such as electric motor, steam turbine and Diesel or gasoline engine, with a speed of not more than 900 R. P. M. may be used, without any intermediate drive between the pump pinion shaft and the motive power. This reduction in speed is accomplished by means of two sets of gears in the power frame of the pump; the initial set being spiral bevel gears, and the intermediate set, single helical gears. The reduction from the driver to the pump is approximately 20 to 1.

The main shaft of this pump is mounted in self-aligning roller bearings, while the intermediate pinion shaft and the pinion shaft are mounted in roller and ball thrust bearings.

The entire power end is automatically lubricated by means of splash and gravity lubrication.

The fluid end of the pump is designed for a continuous working pressure of 1000 pounds per square inch, and all parts of the power end are designed for a continuous load of 200 H. P.

Some outstanding features of these slush pumps are the forged steel crank shaft, forged steel connecting rods, two-piece piston rods, special alloy steel liners and the fact that the power end and fluid end are so designed that in moving the machine from one location to the other the fluid body can easily be removed from the power end.

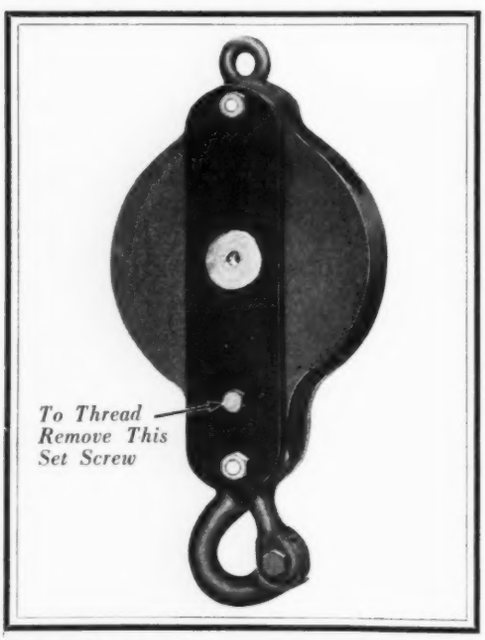
..... AND THE LOAD STAYS PUT

. . . .

A Mere Handful for the Peerless Load Binder and Jack . . .

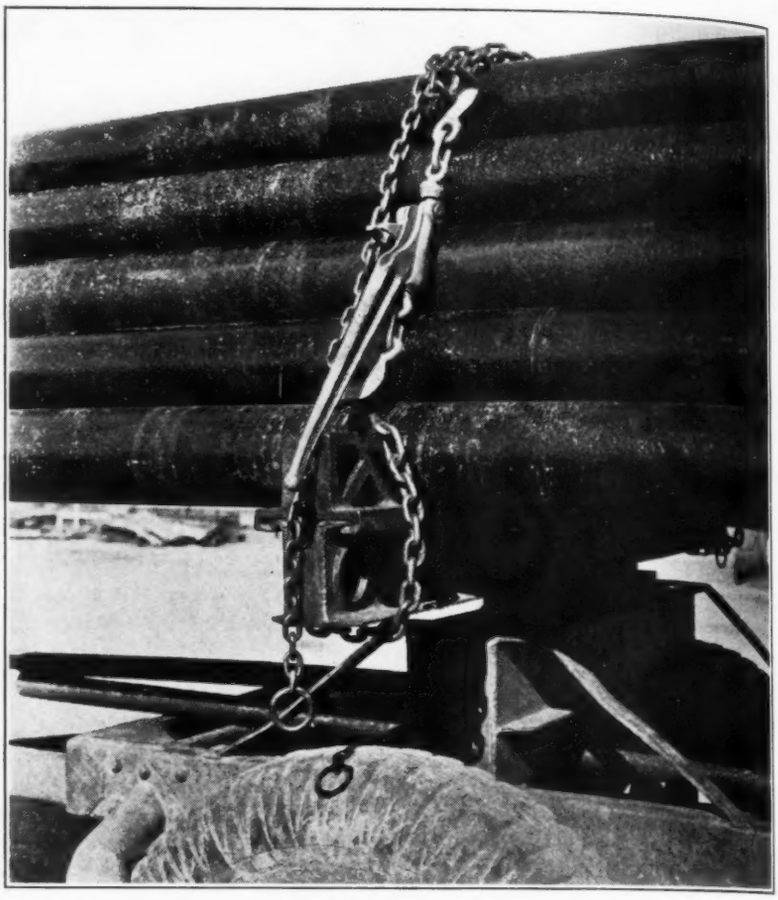
You may have every confidence in the Peerless Load Binder and Jack; for any load — no matter how big — once boomed down will be held tightly, securely, SAFELY. It does its job perfectly for any size load over rough, hilly oil field country as well as over paved city streets.

All-steel, strong, rugged, it is equal to the most arduous tasks. Because of the high quality of the materials in it and its scientific design, it easily withstands the heavy abuse so often put upon it in oil field work.



McKissick Safety Block

Patent No. 17211 and others



Peerless Load Binder and Jack, Patent Nos. 28160 and 299423.

Any amount of chain may be taken up or let out. There is no necessity for a second boomer while booming any part of the load. It is also a perfect JACK for lifting out of mud holes, sand and other bad places on the road or in the field.

Furnished in 20 lb. and 32 lb. weights. Prices upon application. Write us or your supply company.

The 100% Safety Block--Fool Proof

Another Peerless tool that has become **standard** in the Oil Industry is the McKissick Safety Tubing Block. Perfectly safe because it cannot be used without the safety guards **in place.** Fouling or catching of the line is entirely eliminated. Easy to thread. Steel sheaves with machined line grooves. Automatically lubricated by an oil reservoir. Made in all sizes required by the Industry.

See the entire Peerless Line at the Exposition, Booth No. 189

Peerless

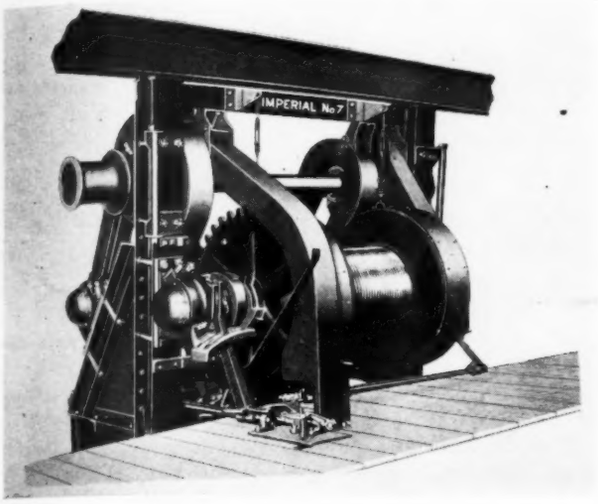
SUPPLY COMPANY, Inc.

122 N. Lansing - - - - - - Phone 5-2121

Tulsa, Oklahoma

New Imperial No. 7 Rotary Hoist

THE Oil Well Supply Company has announced a new rotary hoist, called Imperial No. 7, which is especially designed and highly adaptable for drilling to depths up to 5,000 feet. The new hoist is of the two-post, three-shaft, four-speed, roller-bearing type. It is similar in general



design and construction to the recently announced Imperial No. 9, Imperial hoist for drilling in excess of 10,000 feet. It embodies the one-piece balanced drum, mounted on an alloy steel drum shaft, seven inches in diameter between bearings. The line and jack shafts are each six inches in diameter. The chief difference between these two new hoists is in the construction and arrangement of the braking mechanism.

The braking mechanism on the Imperial No. 7 hoist is a self-contained unit, mounted on the back of the hoist frame and is entirely independent of derrick sills, foundation, etc. No cutting or fitting is necessary when installing this type of brake, as brake band anchor castings and brake shaft bearings are definitely located on the frame supports, which makes mounting of the brake simply a matter of lining up bolt holes. The dead ends of the brake bands are adjustably anchored to the frame through heavy steel castings, the adjustment being simple, foolproof, and easily accessible at rear of the hoist. The live ends of the bands are attached to opposite ends of a heavy bar equalizer, which, in turn, is pivoted in the center, thus assuring absolute equal braking power, equal wear and maximum life for each band, according to the manufacturer. The total braking area is 2,210 square inches.

All shafts are of alloy steel and are mounted in heavy-duty American roller bearings, placed in self-aligning housings. All shafts can be completely stripped of sprockets, clutches, drum and collars on the derrick floor. All sprockets and clutch blocks are cast steel. All clutch sprockets are bronze bushed and Alemite lubricated; and all clutch jaws are hardened.

New Sealing Compound

THE Quigley Company, Inc., located at 56 West 45th Street, New York City, announces the manufacture of a plastic, expansive compound for sealing joints, called Q-Seal.

The compounding of this material was made possible by the discovery of a mineral which is not only a natural lubricant and preserver of metal, but, when subjected to heat, expands several times its normal volume.

This mineral is ground to a very fine mesh and used as the principal ingredient in the compounding of Q-Seal. The principal vehicle, or mixing agent, used is one that is impervious to crude oils and all of their derivatives.

Q-Seal is easily applied to joints with a brush. The expansive qualities fill any imperfections in threads, flanges or gaskets.

New Sump Pump

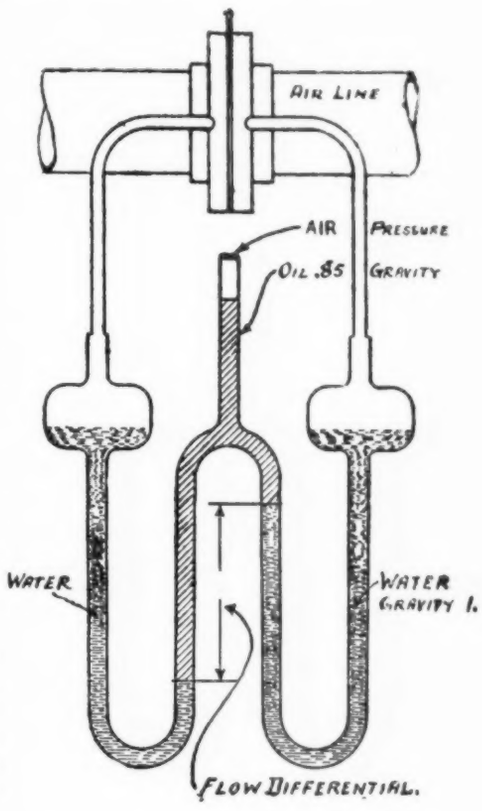
A NEW sump pump is being distributed by the Chicago Pneumatic Tool Company, New York City. It is the CP Quimby sump pump, which is an air-operated pump driven by the CP No. 88 rotary air motor.

This pump is sturdily built and weighs but 44 pounds, with a capacity of 100 gallons per minute at a 28-foot head. Steady capacities may be obtained with the pump up to 50 feet.

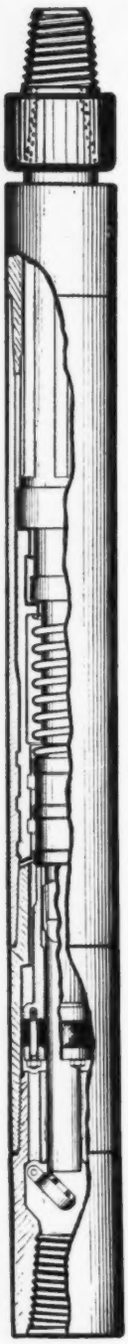
The motor is started before being submerged, and it needs no priming to pump out any manhole or pit to be drained. By using a 2½-inch water hose for an outlet and a ¾-inch air line, this tool can be easily taken from job to job.

New Manometer Type Instrument

A NEW instrument of the U-tube manometer type has been designed by The Meriam Co., Cleveland, Ohio, for the purpose of indicating simultaneously the line pressure and the rate of flow of liquids of gases in pipe lines.



The new type is of entirely different construction, and two different colored non-mixing liquids are used. In most cases red oil and water are employed; but other heavier or lighter liquids may be used, according to the pressures and flows to be dealt with. The design of the new tube resembles a "W" instead of a plain "U." The two outer ends terminate in bulbs having openings which are connected to the pipe line in the same way as the ends of the U tube of an ordinary flow meter. From the middle point of the "W" a riser tube is connected. This riser tube is of a height proportionate to the line pressure to be measured and to the liquid used.



The Shaffer Pump Trip Hydraulic Jar

THE Shaffer Tool Works, Brea, California, has recently added a new article to its line of fishing tools—the Shaffer pump trip hydraulic jar. This device is extremely simple to operate and exceptionally powerful in action, the manufacturer states. To operate the driller lowers the drill pipe to set; pulls up until he has the desired strain; gets the blow by starting the pump, which trips the jar. The driller then resets the jar by lowering the drill pipe and proceeds as before. Thus with one man at the drawworks and another at the pump the jar is operated as fast as the drill pipe can be raised and lowered, using only the engine and the brake without throwing out the clutch or having to use the table to set or trip the jar. The jar has come out of the hole after 75 hours' jarring in perfect condition, according to the maker. Circulation is maintained at all time except when jar is set for tripping.

Gaso-Buda Portable Diesel Pumping Unit

THE Gaso Pump & Burner Mfg. Co. of Tulsa, Okla., is marketing a new item of petroleum equipment, a portable Diesel pumping unit. This 92- or 120-horsepower Diesel is a light-weight, high-speed type that requires practically the same space as a heavy-duty gasoline engine. The engine operates efficiently on fuel having a Baume gravity of 26 to 38 degrees.

One of the main reasons for the lightness of these engines is the compressorless construction—that is, the system of injecting fuel into the cylinders without the aid of compressed air.

The pump is made with interchangeable liner fluid ends, which give capacities ranging from 54 barrels per hour at 1400 pounds to 500 barrels per hour at 300 pounds pressure. It has an enclosed crankcase, with all working parts running in an oil bath; tapered roller pinion bearings, solid herringbone gear mounted in the center on steel crankshaft, and genuine babbitt main bearings.

Byron-Jackson Ships New Size Tongs

A LARGE foreign company has recently placed an order for 24 Byron-Jackson side door slip elevators, manufactured by Byron-Jackson Co., Los Angeles, Calif. The order consisted of eight of each of the three popular sizes now manufactured—13⅜-inch, 10-inch and 7-inch. The latter is a new size that has proven popular for handling flush joint drill pipe, as well as standard drill pipe and casing.

These side door slip elevators can be snapped on and off the tubing, pipe or casing without removing cement heads, or circulating heads. The spring-floated slips can be set by hand at any point desired, or will set positively on the collar.

The manufacturers announce that a new size for handling 2-inch, 2½-inch, 3-inch and 3½-inch tubing will soon be placed on the market.

Climax Carburetion Process

THE process of carburetion in the new Blue Streak distillate burning engines of the Climax Engineering Co., of Clinton, Iowa, and Chicago, is obtained by using a standard carburetor with slight modifications to permit the use of more viscous fuels.

In order to provide flexibility necessary for the handling of different loads and speeds the heat that is to be supplied to the fuel mixture is varied automatically with the load. The mechanism which controls this function consists of an aluminum casting attached to the carburetor, comprising a siphon, air valve, water injection valve and an air cleaner. An automatic heat control operating from the load of the engine is also a part of this mechanism.

Copper tubing connects the siphon to the intake manifold so that pressure changes caused by different loads are transmitted to the siphon, creating a motive power which causes operation of a valve that controls the supply of heated and unheated air admitted to the carburetor.

The siphon expands when the manifold pressure rises, causing the valve to move which reduces the intake of hot air until at wide open throttle none is used, permitting only the unheated air to pass into the carburetor. When a demand for power output exceeds three-quarters load, the siphon opens a valve connected to the spring loaded needle valve which controls the supply of water to the fuel mixture.

Automatic Safety Drill Collar

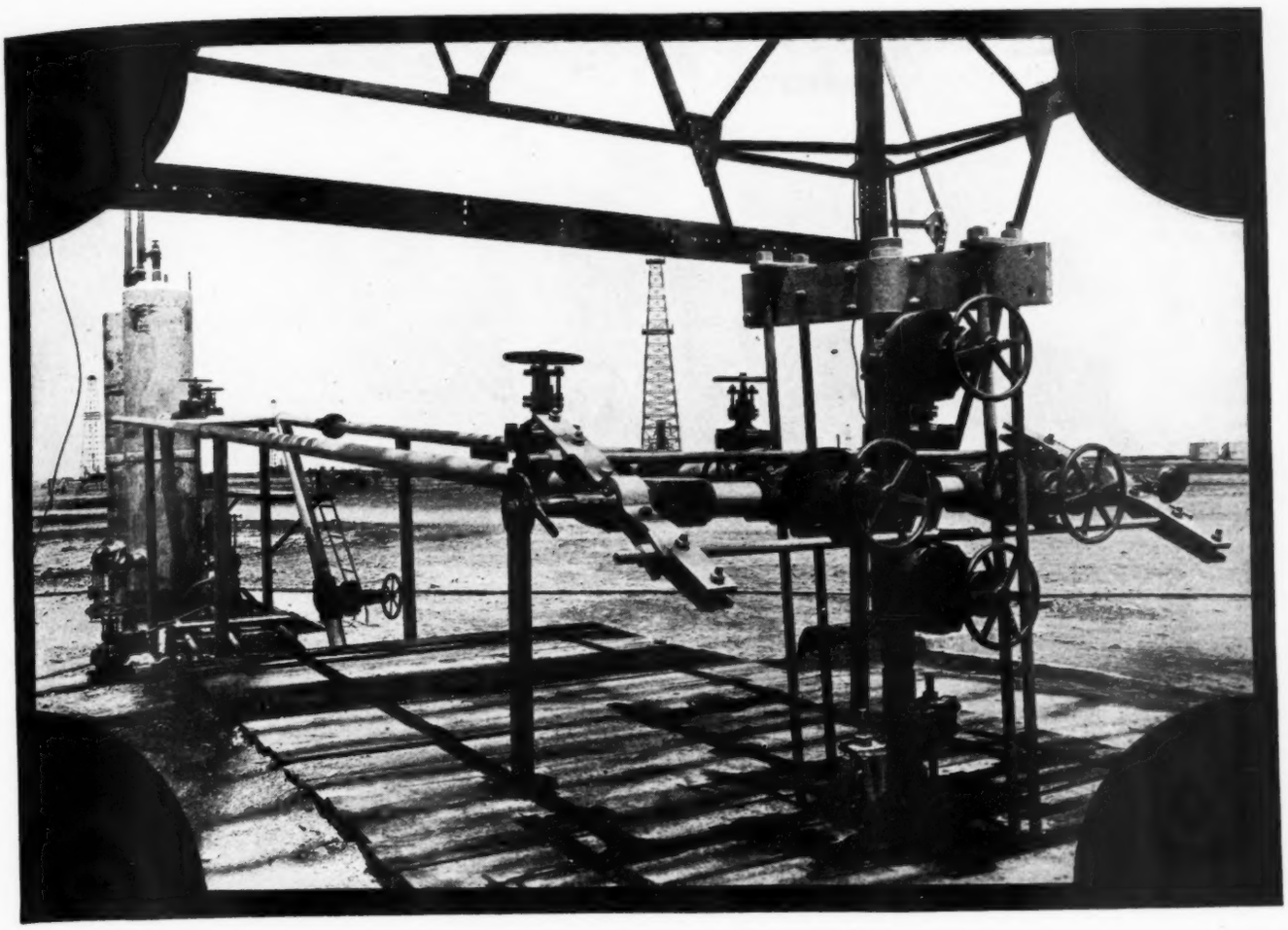
THE Brewster Co., Inc., Shreveport, La., is now manufacturing a safety drill collar which prevents a drill bit of any kind from what is commonly known as backing off while going in the hole. The locking device is automatic. It will allow the drill bit to make up, but will not allow it to unscrew.

A slidable ring locks the bit, and when moved up it permits the unscrewing of the bit in the usual way. To lock the bit merely means allowing the loose ring to automatically drop down below the point of the projecting blade.

Chicago Bridge & Iron Opens Birmingham Plant

CHICAGO BRIDGE & IRON WORKS, Chicago, Ill., announces the purchase of the Reeves Brothers Company plant at Birmingham, Alabama, and is now in position to make shipments from this convenient central location.

The plant is equipped to handle a wide range of steel plate work in addition to Hortonspheres for pressure storage, gas holders, and storage tanks for tar, oil or water.



A 100% Kerotest Valve and Fitting Installation Protects this $20,000 per day Oil and Gas Producer

« « « « « « « The Ohio-Independent Northrup No. 1 Well at Hobbs, New Mexico, which came in with an initial flow of 9,000 barrels of oil and 48,000,000 cubic feet of gas, is one of the many good producers throughout the petroleum world equipped with Kerotest—the famous kerosene-tested valves.

Here is a certified line of valves that has never been known to fail—just one of the many reasons it enjoys the explicit confidence of drillers and operators everywhere.

KEROTEST

KEROTEST MANUFACTURING CO., PITTSBURGH, PA.

Carried in Stock and Sold by

NORVELL-WILDER SUPPLY COMPANY, Houston, Beaumont, Shreveport, Fort Worth

OIL WELL SUPPLY COMPANY

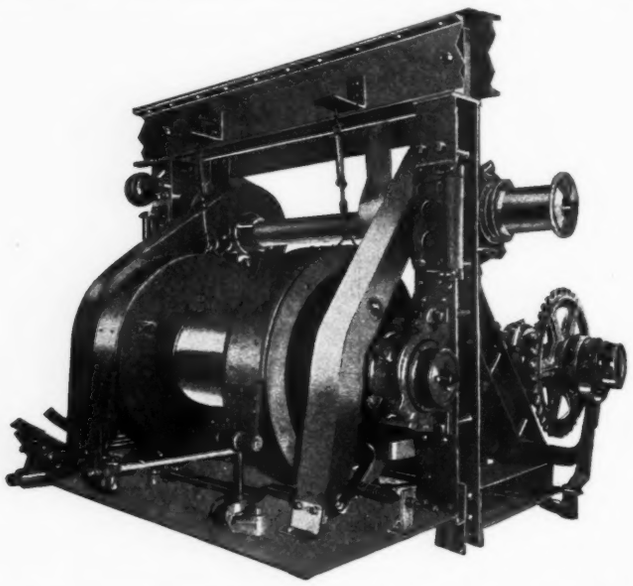
Branch Stores and Offices throughout the World

When writing KEROTEST MANUFACTURING CO. *please mention The Petroleum Engineer*

Ideco Super-Duty Four-Speed Drawworks

THE International Derrick & Equipment Company has an interesting development in oil field machinery in its new "Super-Duty" two-post, three-shaft, four-speed drawworks which is intended for drilling wells 12,000 feet and deeper.

All shafts are made of chrome nickel steel, heat treated. The shafts have full diameter between the bearings and



are not turned down at clutches and sprockets. The shafts are mounted in heavy-duty roller bearings. The bearing housings are made of alloy steel and are of the self-aligning type, which permits the bearing assembly to swivel sufficiently to insure perfect alignment with the axis of the shaft.

The spooling drum and heavily ribbed drum flanges are cast integrally, forming a well-balanced, strong and durable drum of one-piece construction, according to the makers. The drum spooling surface is grooved for wire rope and the large diameter of the drum affords a wide bending radius to the wire line. Plain drums will be furnished if desired.

The brake flanges are water-cooled and are offered in two types—one made of nickel cast iron and the other of forged alloy steel. Both brake bands are of the free-expanding, non-bursting type. All contacting surfaces are accurately machined. Watercooled flanges are recommended for 3,000-foot and deeper drilling service.

The steel brake bands are lined with a high-grade asbestos brake lining, having brass wire heat conductors interwoven throughout. Braking mechanism is furnished in either the post type or floor type.

The drawworks is equipped with steel catheads. Ample space is provided for automatic cathead or joint breakers.

All sprockets are of chrome nickel steel.

Haynes Stellite Company Opens New Foundry

HAYNES STELLITE COMPANY, Kokomo, Ind., a unit of Union Carbide and Carbon Corporation, has completed a new foundry at the Kokomo Works, which has been built expressly for the manufacture of the Hastelloys, a group of new acid resistant alloys. The most up-to-date and efficient foundry equipment procurable has been installed to insure careful control of quality and uniformity of product, the company affirms.

New Pacific Coast Darling Valve Offices

THE Darling Valve & Manufacturing Company has opened new Pacific Coast offices and warehouse at 2450-56 Hunter Street, Los Angeles, Calif. The new offices are being managed by Harry L. Carr.

C. F. Braun & Co. Completes Units

C. F. BRAUN & CO., makers of refinery equipment, have completed the construction of an absorption plant for the Ohio Oil Company in the Playa del Rey section of the Venice, Calif., field. The absorption plant is designed to extract and stabilize 12,000 gallons of gasoline per 24 hours from 5,000,000 cubic feet of gas. This is the first plant in the field, treating the gas from Ohio's discovery well and other adjacent wells.

The Del Rey Oil and Refining Company, Ltd., operating in the Venice field, has recently contracted for the construction of an absorption plant to treat 10,000,000 cubic feet of gas gathered from various wells every 24 hours. The contract stipulates that the plant must be ready to make gasoline within thirty days. This contract has been awarded to C. F. Braun & Co.

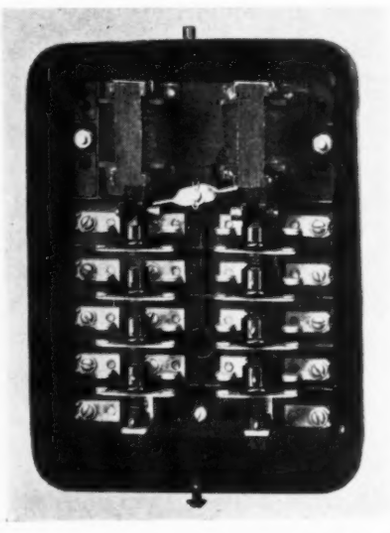
In Texas, C. F. Braun & Co. will complete construction shortly on an absorption plant for the Signal Oil Company at the Best field. This plant will treat 35,000,000 cubic feet per 24 hours of natural gas and yield 27,000 gallons of gasoline daily.

Another plant under construction by Braun is at the holdings of the Big Lake Oil Company at Texon, Texas. This plant will have a capacity of 50,000,000 cubic feet of gas per 24 hours and is scheduled for completion some time early in the fall.

Bridgeport at Hobbs Moves to New Stores

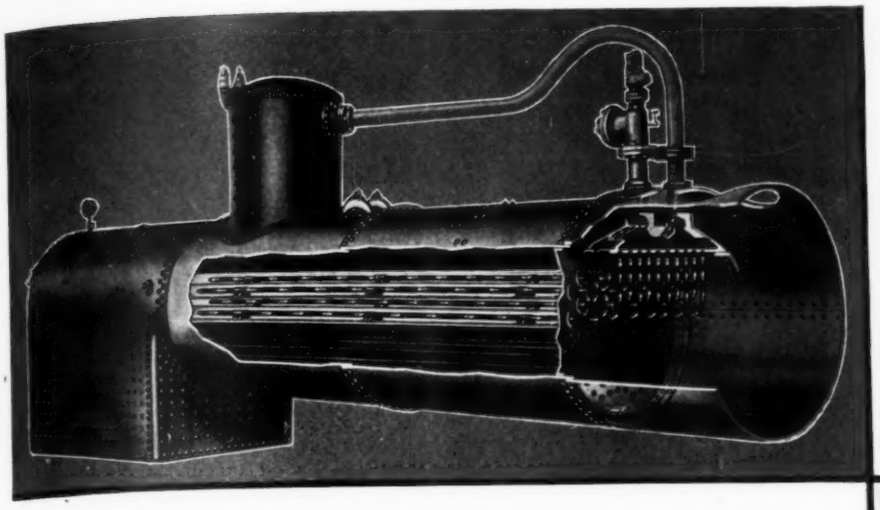
THE Bridgeport Machine Company branch supply store at Hobbs, New Mexico, is now in its new building in the heart of supply row. The building is a 36 by 104-foot steel constructed building.

Control for Reversing Small Motors



THE General Electric Company announces a convenient reversing equipment for small motors, CR-7009-B-19. This switch is designed to handle squirrel-cage motors rated 1½ horsepower at 110 volts and 2 horsepower at 220, 440, 550 and 600 volts, 25 to 60 cycles.

The switch consists of two contactors mechanically interlocked and having four sets of contacts and terminals. Three of these contact sets are for power circuits and the remaining one is for the holding circuit of the coil. The terminals are front connected and are marked to facilitate wiring.



Cut-away view shows steam flow inside tubular units from saturated steam headers to superheated steam headers. Hot gases around tube elements change saturated steam to dry steam.

BRODERICK Superheaters

Establish Records *for* Faster Drilling With Lower Pressures

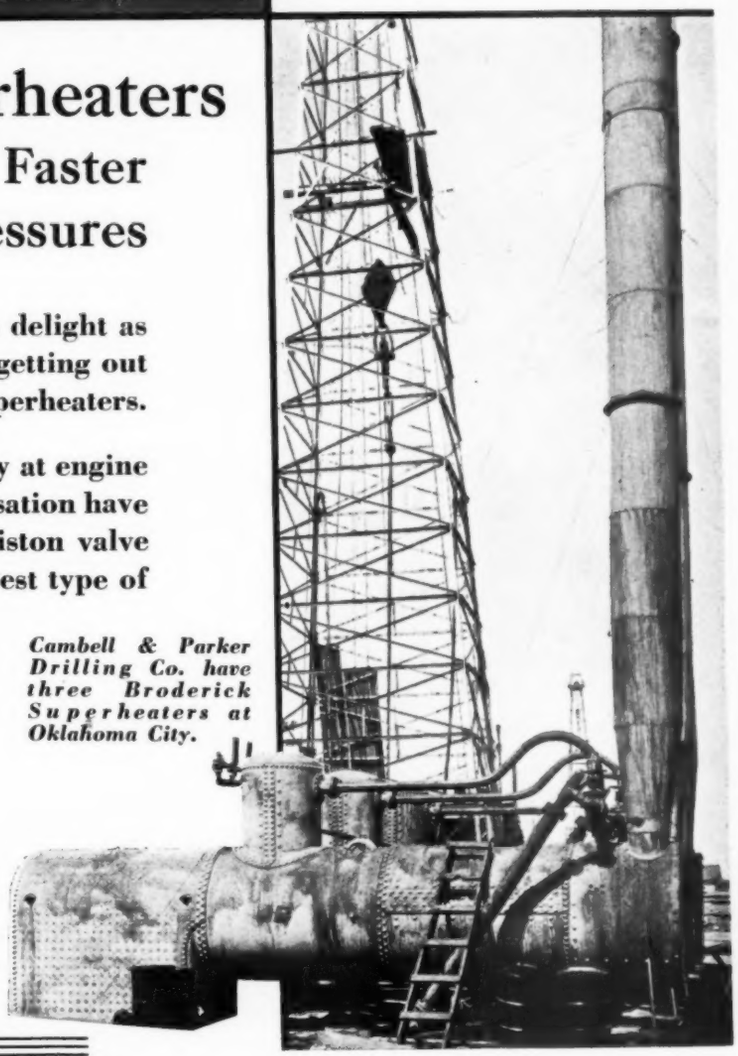
DRY steam does it! Operators express delight as well as surprise with results they are getting out of pumps and engines with these new Superheaters.

With superheated steam that is really dry at engine and pump, the troubles known with condensation have been eliminated. Especially in the new piston valve type, roller bearing engine . . . with the latest type of high speed tools . . . the Broderick has shown results never thought attainable.

Ask the National Supply Man for Details.

For Engineering Data, address

THE BRODERICK COMPANY
Boiler Manufacturers
MUNCIE, INDIANA U. S. A.

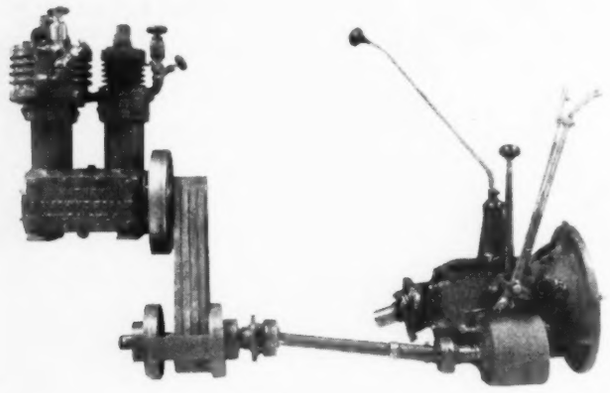


Cambell & Parker Drilling Co. have three Broderick Superheaters at Oklahoma City.

BRODERICK BOILERS
WITH
ELESCO SUPERHEATERS

Gas Test Compressor

COMPLETE testing device for determining the content of gasoline in natural gas is being manufactured and sold by the Mathey Grinding and Machine Works, 305 East 3rd Street, Tulsa, Okla. The entire device is installed within the turtle back of a car.



The motive power is furnished by power take-off, direct from the transmission of the car. In making the change for the power take-off no changes are made in original transmission, as the Mathey transmission is an integral part of the car's transmission. All parts are standard to the make of car and may be secured from practically any parts dealer.

The compressor completely assembled weighs 135 pounds, size over all being 21½ inches by 18 inches by 10 inches.

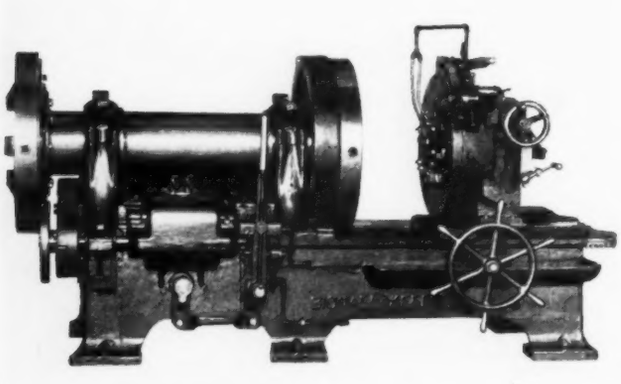
The gasoline accumulator is the only piece set on the outside of the car, and is cast from acid-proof bronze. The installation is made on a quarter-inch boiler plate platform within the turtle back.

The complete installation is made without cutting the body of the car.

Duplex Improved Pipe Machine

A NEWLY developed No. 8 duplex improved pipe threading and cutting-off machine is being placed upon the market by Bignall & Keeler Machine Works of Edwardsville, Ill.

This machine is designed to cut and thread pipe and casing from 2½ to 8¼ inches. It is equipped with Peerless sliding die-head, with expanding dies; screw adjustment is provided for accurate setting of dies to proper size, a positive locking arrangement takes all strain from adjusting screws and insures duplicate threads. The heavy bed casting rests directly on the foundation. It is strongly braced and has suitable provision for mounting working parts on the machine. The lower half of the gear-box is a part of this bed casting.



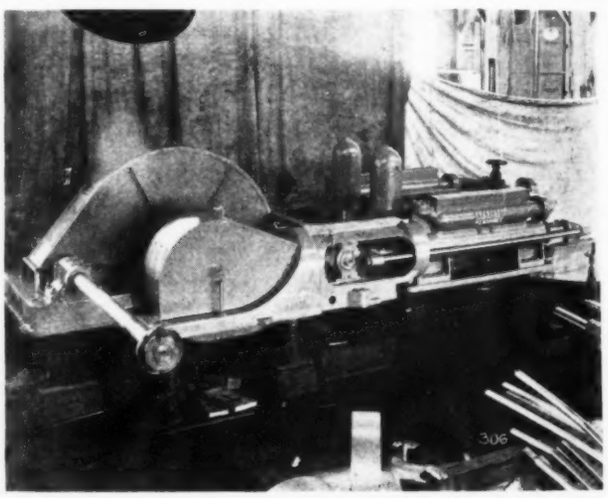
Eight speed changes are provided through broad face steel cut gears, running in oil, in compact gear-box. A two-way positive clutch is mounted on the bed shaft. This clutch has both fast and slow positions and provides a quick stop and start for the machine. It also enables the operator to shift quickly to the higher speeds. Power is transmitted to the revolving parts from below.

A three-jaw chuck is mounted on each end of the arbor, each jaw having a tempered tool steel gripper which can be readily removed for sharpening. The rear chuck has special flange grippers. The machine is furnished with a geared oil pump, which provides a constant stream of oil for the dies and cutting off tool.

Prescott Awarded Great Lakes Order

THE Prescott Company has recently received from the Great Lakes Pipe Line Company, Ponca City, Oklahoma, an order for sixteen (16) 5¾ x 24 inch, twenty (20) 4⅝ x 18 inch and six (6) 4¼ x 12 inch horizontal, duplex, double-acting plunger pumps, designed for a working pressure of 800 pounds per square inch.

These machines will be used in the main line stations of the Great Lakes Company for the pumping of gasoline from the vicinity of Barnsdall, Oklahoma, to Des Moines, Iowa; Chicago, Illinois; Milwaukee, Wisconsin; Omaha, Nebraska, and Minneapolis, Minnesota.



All of these pumps will be direct connected to Winton Diesel engines by means of fast flexible couplings, and the reduction from engines to pumps will be made by means of a single set of herringbone gears.

The attached photograph shows the type of equipment that is to be furnished.

Several important features are embodied in the design of these gasoline pumps; the outstanding one, according to the manufacturer, being a specially designed stuffing box, resulting in absolutely no gasoline leakage, while at the same time the gasoline is not contaminated with lubricating oil.

The Prescott Company is building and has furnished, during the past year, sixty-six (66) pumps in sizes varying from 7,000 barrels per day to 32,500 barrels per day, for the pumping of gasoline through the main line pumping systems of major pipe line companies to various points in the United States.

Characteristics of Aviation Gasoline

By E. B. BRONTE, *Manager Aviation Department, Associated Oil Co.*

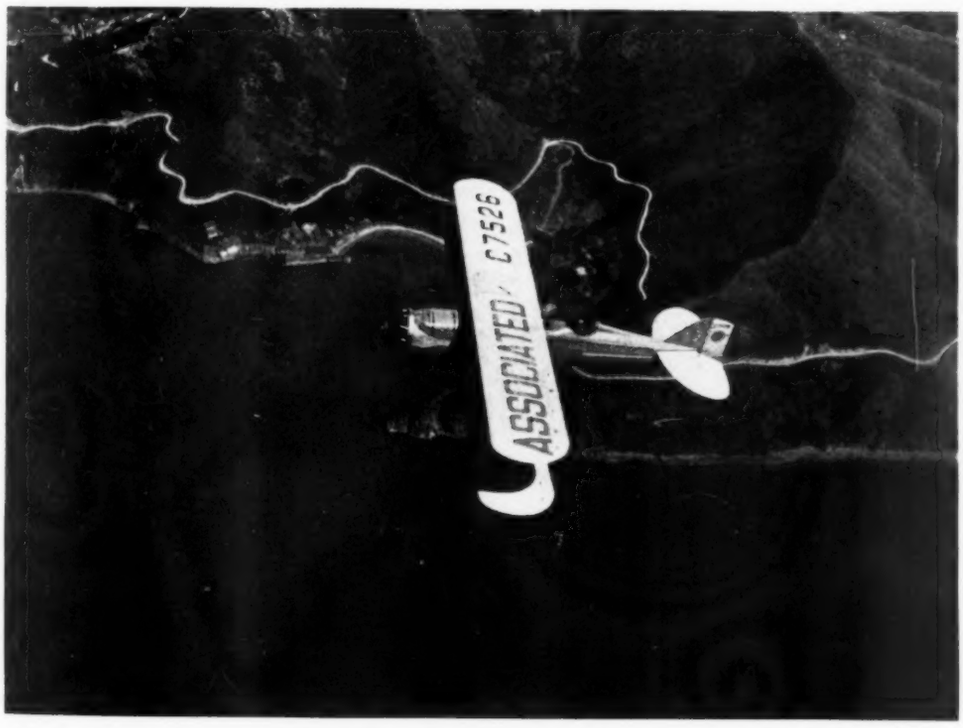
THE principal difference between aviation gasoline and automobile gasoline is the increased volatility of the aviation product. It also weighs less per gallon than automobile gasoline and must have a very high anti-knock value. There is practically no difference in the method of refining the two products, except that aviation gasoline is refined from specially selected crude and is so fractionated that its initial boiling point and end point are lower than the similar specification for automobile gasoline.

E. B. Bronte

Natural gasoline has been marketed in some instances as an aviation engine fuel, the argument in its favor being that it is more volatile than regular aviation gasoline and weighs less per gallon. For these very reasons natural gasoline has proven unsatisfactory as an aviation fuel, as due to its lower weight it contains less heat units per gallon than regular aviation gasoline and is too volatile for even aircraft engines, causing an increase in the evaporation losses and introducing the possibility of vapor lock in the fuel lines, resulting either in complete engine failure or rough engine performance. The correct volatility of regular aviation gasoline is essential in that it insures under all operating conditions and extreme temperatures that a sufficient amount of gasoline will vaporize in order that engine speed may at all times be maintained.

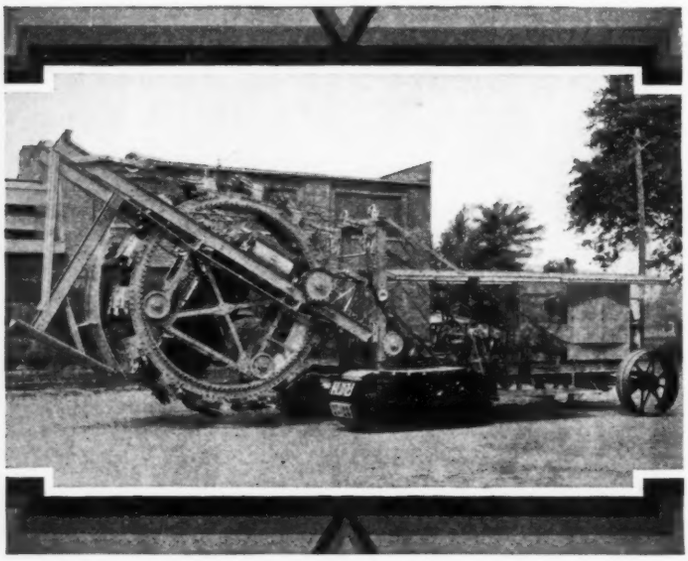
Even though freezing temperatures are encountered at high altitudes, the gasoline must be of a volatility sufficient to insure against the tendency for it to remain unvaporized and thus cause engine failure. Vaporization within the carburetor is also affected by pronounced changes in the pressure of the outside air, which are proportional to the altitude. This condition is overcome by the use of super chargers at high altitudes, which introduce a rarefied air into the carburetor in the form of heavy air as encountered in the altitude near the surface of the earth. A super charger is in reality a system of high-speed rotators which draws in a sufficient volume of rarefied air to provide a quantity of oxygen equal to the amount which would be present in the carburetor at low altitudes.

Due to the fact that aircraft engines develop from 100 to 500 horsepower and to the low efficiency of the aircraft propeller, the consumption rate of an airplane engine is high. This high consumption rate is accompanied by a pronounced cooling effect caused by evaporation. When a light gasoline is evaporated with great rapidity, the remaining portion will often assume freezing temperatures, and for this reason it is easily seen that the carburetor of an aircraft engine must be constructed so as to insure a readily combustible mixture,



Boeing Hornet powered biplane owned by the Associated Oil Company. This plane is used for making business calls at all Pacific Coast airports.

See Buckeye Model 12 at the INTERNATIONAL PETROLEUM EXPOSITION, Tulsa, October 4 to 11



BUCKEYE MODEL 48
Heavy-Duty Pipe Line Ditcher

Cutting Widths: 22" and 24"–26" and 30"–37" and 40"
Cutting Depths: 6½' and 7½'

A LEADER in the complete line of *wheel-type* Buckeyes —"*the* ditchers that meet *all* oil and gas field requirements"—is the new, big, husky Model 48.

It is designed and built specifically for cutting the largest pipe line ditches successfully. Its ruggedness is supplemented with remarkable ease of control, favorite operating features and, like *every* Buckeye, with ample capacity to deliver plenty of finished ditch at decidedly low cost.

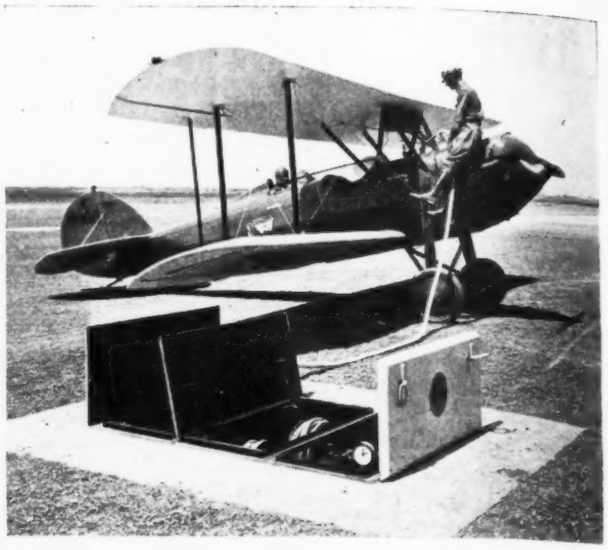
Taking soil and weather conditions as they come, Buckeyes have set the pace in pipe line construction for over 30 years. That they continue to do so, making them the preferred standards of leading pipe line engineers and contractors, is proven by three indisputable facts: 1—more Buckeyes are employed throughout the world's oil and gas fields than all other makes combined; 2—probably 95% of all major American cross-country pipe lines are laid in Buckeye-cut ditches; and 3—nearly every large pipe line contractor uses them exclusively.

Write for our interesting new catalog, "BUCKEYE—*The Pipe Liner.*" It contains comprehensive specifications, describes and illustrates mechanical details, and lists surprising performance records. A full range of sizes offers a Buckeye for every requirement.

The Buckeye Traction Ditcher Co.
FINDLAY, OHIO

There's a Buckeye Sales and Service Office near You

for over thirty years **Buckeye**



Plane being fueled from underground pit. This type pit contains air and water facilities also.

even at the low temperatures which may be encountered in evaporation.

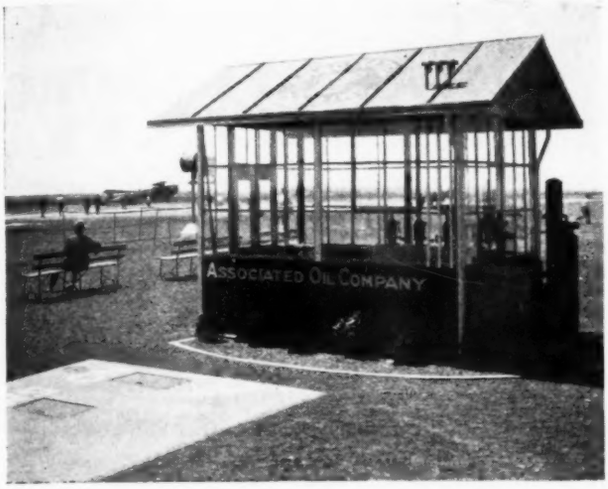
Within the laboratories of our refineries intensive research is being constantly carried on in an effort to continually improve upon the quality of our aviation gasoline. Ethyl aviation gasoline is now making itself known on the Pacific Coast, where it has not been needed, due to the high anti-knock values of our regular aviation gasoline, until the recent advent of higher compression aircraft engines into the squadrons of the army and navy aircraft based there. Much study has also been given by us on the problem of providing proper facilities for fueling aircraft at the many airports located throughout the far western territory.

In the past it was considered sufficient to roll a drum or two of gasoline out on the field and load the gasoline into the fuel tanks of the plane with buckets. During that particular period there was little or no flying activity and crude fueling methods such as these were considered satisfactory. However, the tremendous increase in flying which has occurred during the past three years has made methods such as this out of the question and has developed a need for modern, fast-acting fueling equipment. Fueling pumps used in the servicing of automobiles are unsatisfactory, principally because they present an additional obstacle to be avoided by aircraft when taxiing, and also because their rate of delivery, although of a speed sufficient for the needs of the average motor car, is certainly very unsatisfactory when filling a plane with a gasoline capacity of 100 gallons or more.

This is particularly true of the larger airports, where transport planes of a tremendous size and large gasoline capacity are constantly landing and demanding fast service, but at the smaller airports located in outlying districts small hand-operated automobile fuel pumps are being utilized to a certain extent, despite the danger of collision between them and moving airplanes. The most practical method of fueling aircraft is the use of a gasoline meter, which provides a rapid, continuous flow of gasoline. These meters can be placed underground and located at any convenient point on a flying field without offering an obstruction to planes as they taxi about the field. The gasoline can be delivered at any predetermined speed, depending upon the size of the pump and meter used, and it has been developed that for all practical purposes a speed of from 20 to 30 gallons per minute is most suitable. By the use of these meters it is possible to distribute gasoline to any number

of points on a flying field from a central pumping and storage plant located at some point near the center of activity. Such an advantage allows an operator who is just starting to develop the business of a new field to make an installation adequate for his present needs and one that can be extended as the demands of the field increase. The gasoline can be pumped with economy and safety for great distances, the only thing limiting the distance being the possibility of the cost of the pipe line exceeding the cost of installing an additional pumping unit and meter.

At one Pacific Coast airport gasoline is being pumped over 1500 feet, which distance could be increased to over 2000 feet if necessary. A complete airport fueling unit consists of underground storage tanks, pumping equipment, station building containing lubricating oil tanks and the underground meter unit. This usually consists of a 1-inch



Associated Oil Company service station located at Oakland airport, Oakland, Calif. Similar stations have been erected by this company at the principal Pacific Coast airports.

Granberg petroleum meter installed in a steep underground pit, the covers of which are flush with the top of the ground. These covers are heavy enough to support any size plane which might happen to pass over them. In addition to the meter within the tank, there is the gasoline hose, having at its end an outlet valve with a flexible nozzle for insertion into the gasoline tank of a plane. The flow of gasoline into the plane is controlled by the valve at the end of the gasoline hose, the pump itself being operated by pressure control.

And so the aviation industry continues to be served by the petroleum industry with gasoline of infallible quality made available at all airports in fueling equipment of the most modern design.

Oil Production Problems Studied by Bureau of Mines

A COMPLETE report of the study made by U. S. Bureau of Mines experts of methods of solving oil production problems in the Seminole area has been published by the Bureau. The report contains illustrations and tables, as well as general data collected in a survey of nine oil fields in co-operation with representatives of the State of Oklahoma.

It is available as "Bureau of Mines Report of Investigations 2997, Engineering Study of the Seminole Area, Seminole and Pottawatomie Counties, Oklahoma," by R. R. Brandenthaler, W. S. Morris and C. R. Bopp, from Petroleum Experiment Station, U. S. Bureau of Mines, Bartlesville, Okla. No charge.

Achievements are the WORK of YEARS

THE LAYNE MILLED GROOVE *Screen* IS THE DEVELOPMENT OF 1/4th CENTURY

And the Oil Industry has its most important invention—an achievement—and the development of more than a quarter century of building screens and the solving of screening problems, the Layne Milled Groove Screen.

This "greater production" screen—guaranteeing from 33⅓% to 100% increase—was recently proven by Pittsburgh Testing Laboratory to possess great tensile, collapsible, and end strength, having the ability to safely stand 8,000 feet of drill pipe.

The Layne Milled Groove Screen does not clog with mud or sand, avoids sand cutting, and is a tonic to low pressure wells.

Install Layne Milled Groove Screen instead of wishing you had.

Write, wire or phone for quick service, prices, catalogue or information.

The Layne & Bowler Co.

Houston Texas

Install Milled Groove Instead of Wishing You Had

The Layne New York Co. 30 Church St., New York — The Layne & Bowler Corp. Los Angeles, Calif. — Vickers, Limited London, England

"Everything's fine, Frank—"

"THEY came over first thing this morning . . . Parkersburg carries tanks in stock here, you know . . . Sure, their erection crew will have that battery on the Johnson up before night . . . Sure, we'll have them tested with water . . . Okey . . . Yeah, I'll look for you."

And when Frank gets there he'll see first hand how Parkersburg Bolted Steel Tanks have been engineered to combine the strength and service of a permanent installation with knock-down convenience, to meet any future changes in operations.

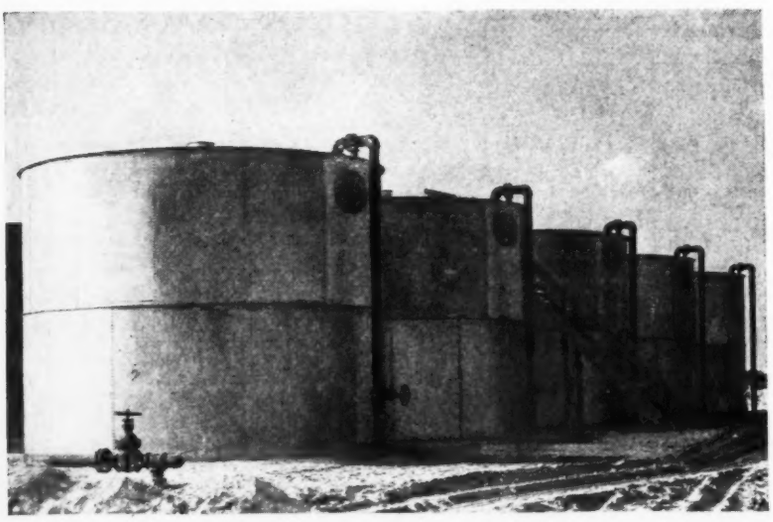
Uniformity and accuracy throughout—in the forming and cutting of sheets and the punching of holes—make assembly fast and easy. And, when these plates of steel, coated heavily with aluminum, are put together, these tanks will remain a "sweet looking" job as long as they are in service. They will retard corrosion, and prevent evaporation.

Vapor-tight Tanks—pioneered and perfected by Parkersburg—should be *your* standard, too. Ask a near-by representative for further facts.

PARKERSBURG PRODUCTS

Bolted Steel and Aluminum Tanks
Steel Derricks and Crown Blocks
Chain-Driven Sand Reels and Bailing Reels
Steel (Bull, Band and Calf) Wheels
All-Steel Standard Rigs
Rig Irons
Portable Drilling Machines (Wood and Combination-Steel)
Miscellaneous Drilling Equipment
Steel Walking Beams and Pitmans

We subscribe to A.P.I. Standards



THE PARKERSBURG RIG AND REEL CO.

TRADE MARK REG.

THE PARKERSBURG RIG AND REEL COMPANY

Main Offices and Works

PARKERSBURG, WEST VIRGINIA

NEW YORK - TULSA - FT. WORTH - HOUSTON

Branches In All Active Fields

When writing PARKERSBURG RIG & REEL CO. *please mention The Petroleum Engineer*

A meeting of the old-timers. Seated in front are J. P. Flanagan, President W. G. Skelly and Barney Harrigan.

Preparations Completed for Seventh Petroleum Exposition

Safety contests at the 1929 Exposition.

PREPARING to turn the searchlight of science and experience into the future of the oil and gas business, the directors of the International Petroleum Exposition and Congress, event on the calendar for October 4-11, announce this week the completion of the major outlines of their program.

Most clearly educational in character and purpose is the work of the scientific and technical committee. In the building devoted to this phase of the industry, the members of this committee report, will be displayed the largest, most representative exhibit of scientific instruments and apparatus ever brought together in the interests of the oil and gas business.

To assure an adequate survey of the entire field, this committee has been divided into groups of specialists who will have supervision in their respective departments of production, refining, natural gasoline manufacture, natural gas and pipe line transportation.

A world-view of the petroleum industry will be offered at the banquet given in honor of international guests, on the opening day. Representatives of the various governments and of over-sea corporations, who are expected to give valuable views on international problems, are from England, Canada, Mexico, Venezuela, Nicaragua, Peru, Argentine, Germany, France, Italy, Roumania, Poland, Russia, India, Egypt, Trinidad, British East Indies, and Holland.

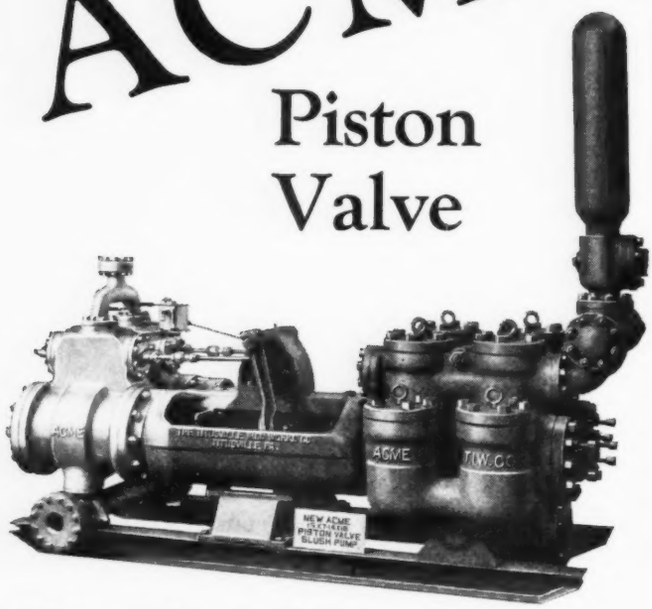
The safety division of the Mid-Continent Oil and Gas Association, whose program in the 1928 oil show won the high praise of Charles M. Schwab, will present its sixth annual safety and first-aid meet, October 9, at the Exposition grounds. Covering other phases of the work which has given the petroleum industry an enviable record among the vocations in the number of maiming and fatal accidents, will be the United States Bureau of Mines, and the National Safety Council.

More than a score of cases are on record in which men

See this New

ACME

Piston Valve



15" x 7¼" x 18" Heavy Duty ·· Slush Pump ··

This new Piston Valve type pump has every refinement—

FOR CONVENIENCE
FOR CAPACITY
FOR RELIABILITY
FOR LOW OPERATING COST

—that sixty years of study and continuous improvement in oil field machinery can offer.

FLUID PRESSURE . . 2000 LBS.
STEAM PRESSURE . . 350 LBS.

[*Get More "Acme" Facts*]

MANUFACTURED BY

THE TITUSVILLE IRON WORKS COMPANY

Division of Struthers Wells-Titusville Corporation

TITUSVILLE, PA.

Mid-Continent Office: 503 Exchange National Bank Bldg., Tulsa, Okla.
For Kansas, Oklahoma, New Mexico and Northwestern Texas: International Supply Co., Tulsa, Okla.
For California: California Machinery & Supply Co., 2449 Hunter St., Los Angeles, Calif.
For Louisiana, Arkansas and Southeastern Texas: Mid-Continent Supply Co., Ft. Worth, Texas.
For Export: American Steel Export Co., Inc., 295 Madison Ave., New York, N.Y.

TITUSVILLE OIL FIELD EQUIPMENT

GAS ENGINES · PUMPS · BOILERS
DRILLING RIGS · STEAM ENGINES

TIW-73

and women who have witnessed the first-aid demonstrations of the Mid-Continent Oil and Gas Association and the Bureau of Mines have utilized that chance opportunity in the saving of a life.

How expert drillers, with the most modern equipment, sink their bit into the earth, will be found to be much more than a mere matter of proper mud fluid, cementing and weight adjustment. Graduates are non-existent in the oil and gas business, and it is entirely probable that veterans will come upon several useful "finds". Several of the rigs on the grounds will be making hole.

At the side of a replica of the first oil refinery, the original of which was built by William Barnsdall in 1860, will be presented a large exhibit which will throw light upon the latest refining development, the hydrogenation process. This process now makes it possible to extract a much greater quantity of gasoline from a given amount of crude oil, by building the residual fluid back up with hydrogen to its condition before distillation.

Every piece of apparatus used in making the A. S. T. M. and A. P. I. tests upon products of the industry, solid, liquid or gaseous, will be presented and their operation explained by attendants in the scientific and technical booths. The range of the scientific displays is much too wide for an enumeration here.

Demonstrators will ply the arts of glass-blower, welder, hard-facing, fire fighter, resuscitator, and of hundreds of other important activities. One of the nation's leading experts in the manufacture of the glass parts used in scientific apparatus of all kinds will show his skill.

One of the most instructive features of the oil show will be the sessions of the open forum conducted under the supervision of a group of scientists and economists. Every one connected with the oil and gas industry is urged to send in descriptions of problems which have arisen in their work. The problems will be suitably grouped by a committee and set upon a date schedule for discussion and solution in the open forum.

If you are "stumped" you can place a number of recognized authorities to work on your puzzle and hear the answer at the oil show auditorium. If your interests lie more in the direction of problems covered in such studies as international relations, law, corporation structures, ethics and the like, your questions also will be welcomed and slated for discussion.

It is not unusual for a long delay to be caused on the drilling site by a problem suddenly arising in connection with mud fluid, peculiar results in cementing jobs, water trouble, and the like. On such occasions the services of an analytic chemist is demanded. It is to eliminate the pres-

Replica of the original Drake well.

The Bureau of Mines exhibit.

ent delays caused by the remoteness of analytical laboratories that the United States Bureau of Mines, Bartlesville station, has perfected a compact laboratory for controlling the field operations, and this laboratory will be exhibited in the scientific building. Work on the subject of corrosion has been conducted in this contribution of the bureau.

By far the most unusual display will be that of the "colpoids," strange bits of matter which are large enough to be seen by the naked eye, and which act exactly as if they possessed life, although they are purely artificial organisms produced in the bio-chemical laboratory.

The modern phase of the physio-chemist's experiments on the production of living matter from non-living matter may be said to date from Prof. Stephane Leduc, of France, who startled the world some decades back by producing very close imitations of small organisms and plants, these latter growing to the height of seventeen inches.

Professor Alfonso L. Herrera, Mexico, represents the latest phase of this work, and the cannibalistic, pulsating, growing and tropistic artifacts to be shown at the oil show are his work. Bio-chemists of the United States, Mexico, France, Italy, England and Germany are intensely interested in these "colpoids" and it may be that visitors at the Exposition will see the last step before the realization of the prediction of Sir Oliver Lodge, noted British physicist, and his compatriot, Professor J. B. S. Haldane, leading biochemist, that one day scientists will produce living protoplasm in the laboratory.

The management of the Exposition has not lost sight of the fact that although the oil show program is vastly interesting, something must be added to relieve the singleness of the tone. A mounted brigade of nearly 200 trick riders, broncho busters, bull-doggers and lariat experts, ranging in ages of from five years to fifteen years, will demonstrate their prowess in the large space between the California building and the Scientific and Technical. The boys have received training since they were old enough to straddle a saddle and their performance reflects courage and a fine knowledge of horses.

NOW·· more than ever

Does It Pay to··

Cut Production Costs

If it is advisable to keep production costs down during prosperous times, it is doubly advisable to do so now.

When you use the Drop & Seat you are guaranteed at least 50% saving in valve-check replacements. Pulling costs time and money. The Drop & Seat, reducing replacements by 50%, reduces pulling costs by a similar percentage.

Only the highest grade of materials and the best workmanship are used in the making of the Drop & Seat. Frequent inspections assure a perfect product.

If you do not effect a 50% reduction in pulling costs by employing NO-CO-RO Drops & Seats, Norris Brothers will refund your money. Thus, you have nothing to lose, everything to gain.

Your order sent to any one of Norris Brothers' well-stocked warehouses will receive prompt attention.

NORRIS BROTHERS, Inc.

ROBINSON, ILLINOIS

Tulsa, Okla. Owensboro, Ky. Ft. Worth, Texas

When writing NORRIS BROTHERS, INC., *please mention The Petroleum Engineer*

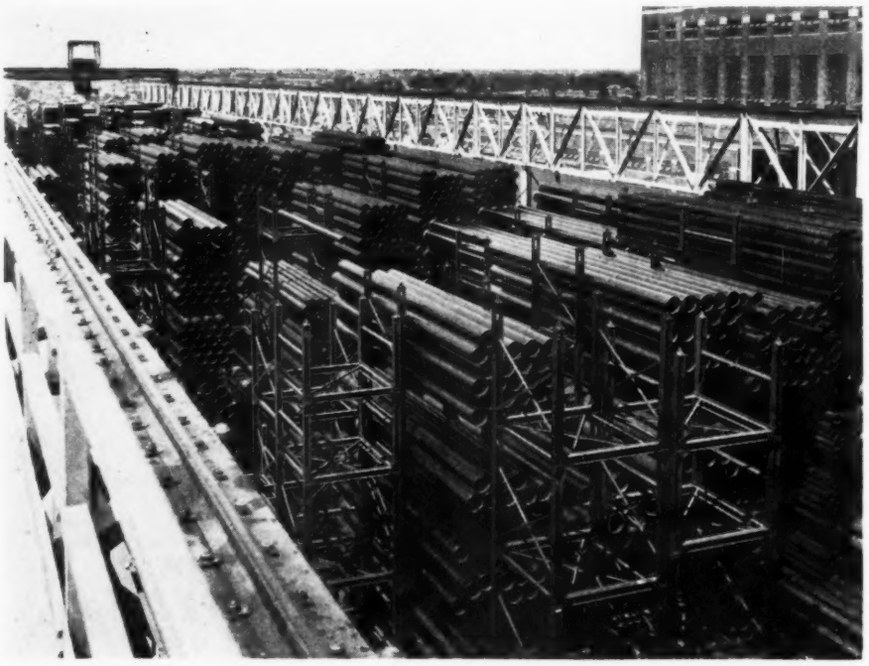


Fig. 1

Efficiency Applied to Pipe Storage

THE question is often asked, "How much pipe can be stored in the A. O. Smith Corporation pipe storage for immediate delivery?" No matter how wild the guessing becomes, very few come anywhere near the actual capacity. The quantity is enormous and can be realized only by comparative figures. For example, if we were to fill up the storage completely with 10-inch pipe, a common size, enough pipe would be stored there to build a pipe line from Kansas City to Chicago, a distance of 450 miles. This quantity of pipe in 40-foot lengths amounts to 952 carloads, or 19 trains of 50 cars each. If these trains were run end to end, they would form a continuous train of over nine miles in length. The combined weight of these 952 carloads of 10-inch pipe is also rather staggering. The total tonnage would amount to 38,500 tons, or 77,000,000 pounds. In a visualized form, this weight is about the same as a solid block of concrete 30 feet square and 570 feet high, or 15 feet higher than the Washington Monument, which towers 555 feet above the ground. In all probability the famous monument, including the foundations, does not weigh any more than the 10-inch pipe which might be stored under the craneway.

The pipe storage consists of a mammoth craneway, having a span of 100 feet and a travel of 695 feet, with the bottom of the crane rail 77 feet above the ground. The crane has a rated capacity of 50 tons and is equipped with all the latest improved safety devices to insure perfect operation and safety for employes and equipment. Figures No. 1 and No. 2 show the crane in operation and give one some idea of the size and height of the craneway.

It will be noted that the pipe is stored in steel crates,

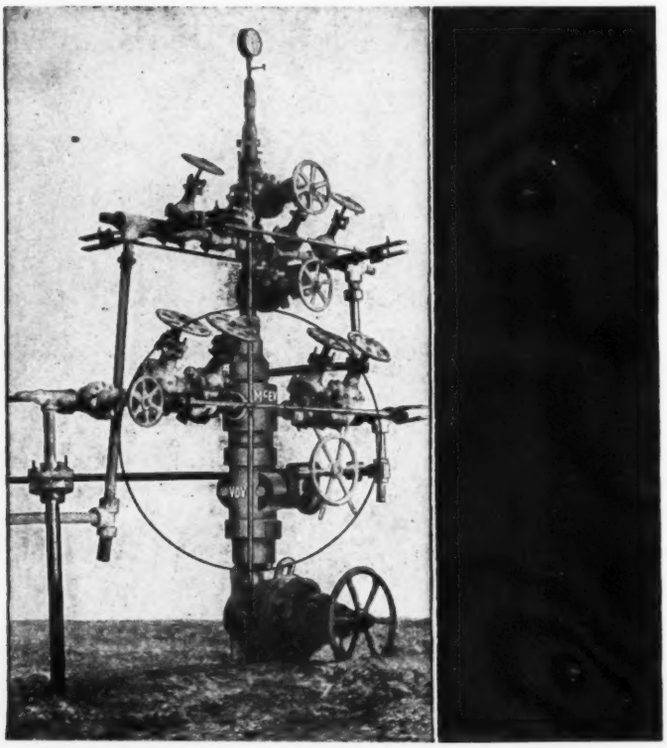
Fig. 3

JONES

You can write your own ticket to satisfactory sucker rod performance by insisting on "Jones"... *the* original high manganese rods... 10,000 to 40,000 pounds per square inch higher in tensile strength than the best standard carbon steel sucker rods... *the* one rod that will withstand 3 times the strain of the average service if the joints are properly made up... a rod made to strict A. P. I. specifications.

THE S. M. JONES CO.
TOLEDO, OHIO
Mid Continent Office:
McBirney Building, Tulsa, Okla.

JONES HIGH MANGANESE SUCKER RODS
« DOUBLE PIN TYPE »



TO KILL A WELL IS NO LONGER NECESSARY IN ORDER TO RENEW A VALVE OR A CUT OUT CONNECTION ON THE CHRISTMAS TREE

The McEVOY UNIVERSAL TUBING RETRACTOR 1—will permit separation of tubing sufficient to close master gate valve . . . 2—relieves Christmas Tree of all pressure while repairs are being made . . . 3—not necessary to loosen the down rods . . . 4—*can be operated in 30 seconds* . . . 5—NOW BEING USED SUCCESSFULLY IN HIGH PRESSURE FIELDS.

Write for NEW CATALOG—TODAY

J. H. McEVOY & COMPANY
HOUSTON, TEXAS U. S. A.

each containing one carload of pipe, regardless of size. Because of tonnage limitations two sizes of crates are now in use. The smaller crates are 8 feet 3 inches high and are used for pipe from 10 to 14 inches in diameter. These crates may be stacked eight high, making a total height of 66 feet. The larger crates are eleven feet high and are used for pipe 14 to 26 inches in diameter. The larger crates are stacked six high, making a total height of 66 feet, the same as the eight smaller crates. These crates are handled on and off the special flat cars by means of the crane, which is equipped with a carrier having four hooks so shaped that the crane operator can pick up a crate at will without the assistance of anyone and stack it on top of any other crate in the yard, unhooking with the same ease. It will be noted in Figure No. 1 that each upright of the crates is equipped with a pointed shoe which is pierced like the eye of an enormous needle to receive the hooks of the carrier. The pointed tops fit into the bottom of the next higher crate to form a firm connection.

The heavy loads resulting from such stacking of carload lots of pipe made it necessary to build foundations sufficiently large to withstand the pressure and to keep the crates firm and level. One problem confronted was the fact that pipe is made in both 30- and 40-foot lengths. Foundations had to be arranged for either length. Just how successfully this problem was met is proven by the fact that there is only a slight loss in capacity resulting from the change from 40-foot to 30-foot pipe. Figures 3 and 4 show the base plate and pointed shoe on the foundation which receives the crate and holds it firmly in place and level.

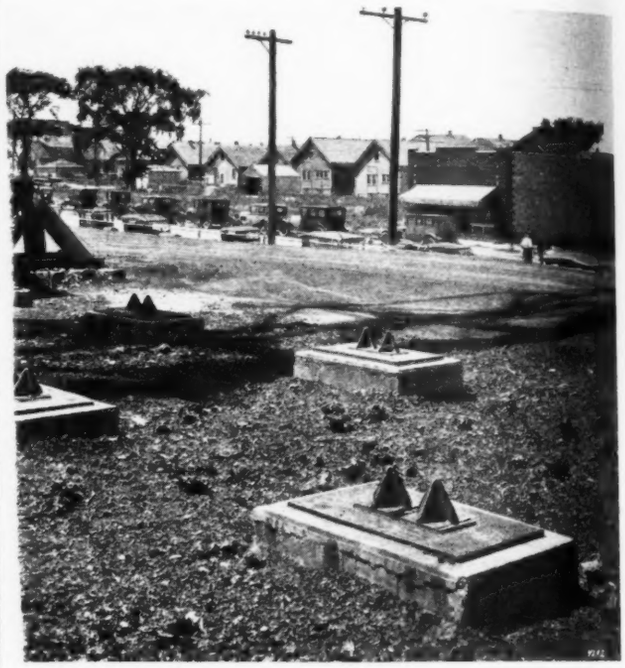


Fig. 4

It is interesting to know that the engineers designed the foundations for a maximum crate load of 50 tons, which amounts to 400 tons per stack of eight crates, or a total of 62,800 tons over the entire craneway. This is equivalent to a uniform loading of approximately 1800 pounds per square foot for the total area of the craneway. A nine-story building designed to carry 100 pounds per square foot of floor area and as large as the entire craneway, 100 feet by 695 feet, might have been built on these foundations.

Just how much pipe might be delivered out of storage to the flat cars per day if pushed for time is hard to answer, as no data are available at the present time. However, the

crane could easily average one carload of pipe from storage to the flat cars every five minutes during the working day of ten hours, allowing for loss in time due to shifting of cars and the lateral travel of the crane. This means that the storage could be emptied at the rate of twelve

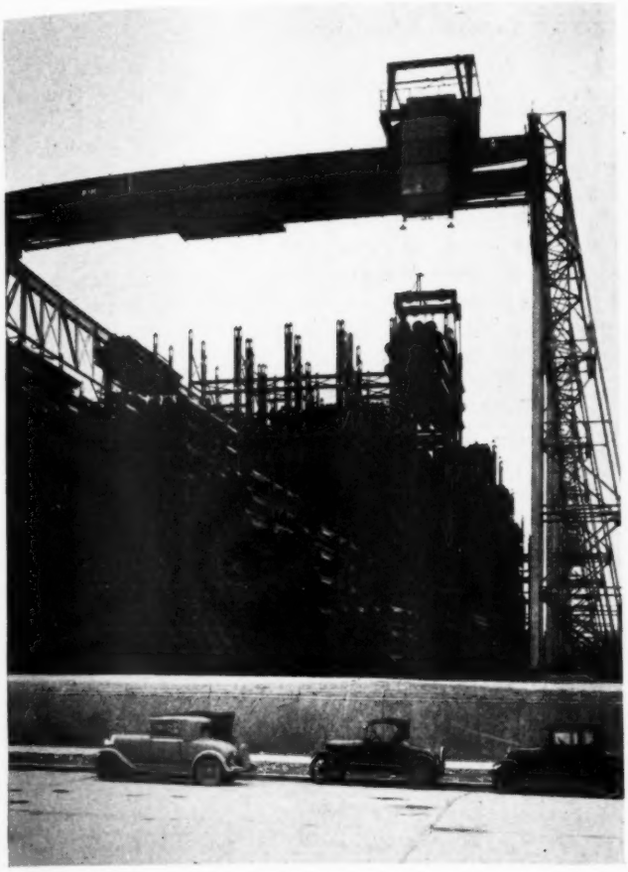


Fig. 2

carloads per hour, or 120 carloads per day. At this rate the last pipe for a pipe line from Kansas City to Chicago could be started on its way in a little less than eight days after the order had been placed, based on the assumption that the storage was filled with the proper sized pipe.

Foster Wheeler Opens Tulsa Office

THE Foster Wheeler Corporation has opened offices in Tulsa at 712 Thompson Building. C. C. Steward is in charge. Steward comes from California, where he has had a wide experience in natural gasoline work.

Station Contract Let to Fluor

THE Fluor Corporation, Limited, 909 E. 59th Street, Los Angeles, has been awarded the contract to build a series of compressor stations on the new natural gas line extending from the Texas Panhandle to Indianapolis, Ind. The job is for the Missouri-Kansas Pipe Line Company and involves approximately a million-and-a-half dollars worth of work.

The stations will have a discharge pressure of 450 to 500 pounds, according to P. E. Fluor, vice-president and general manager of The Fluor Corporation. The first station is to be located at Liberal, Kans., and will have four 1000 horsepower units. The second station will be at Louisburg, Kans., and the third at Louisiana, Mo. Both of these will have six 1000 horsepower units. Work has been started on all three stations.

Gott
Water Cans & Coolers
. . . Have a cool supply of clean-pure sparkling water... ready to drink at all times. No matter where you are the GOTT Water Can is health insurance. Your supply store has them.
Gott Water Cans 1; gal; 3 gal; 5 gal; and 10 gal.
Gott Water Coolers 3 gal; 5 gal; 8 gal; 10 gal; and 20 gal.
Gotkool

Keep Pure Water Always Handy

H. P. Gott Mfg. Company
WINFIELD, KANSAS

PENNSYLVANIA
FORGED STEEL FLANGES

are carefully machined and back faced (except in sizes 4-inch and under).

For screwed joints, all our Flanges are threaded to Briggs Standard Gauges. Threads are chased and rechased, and chamfers are cut to protect the starting thread against damage in transit or handling.

PENNSYLVANIA FORGE COMPANY

The strength of the line is only the strength of the flanges

Distributed by

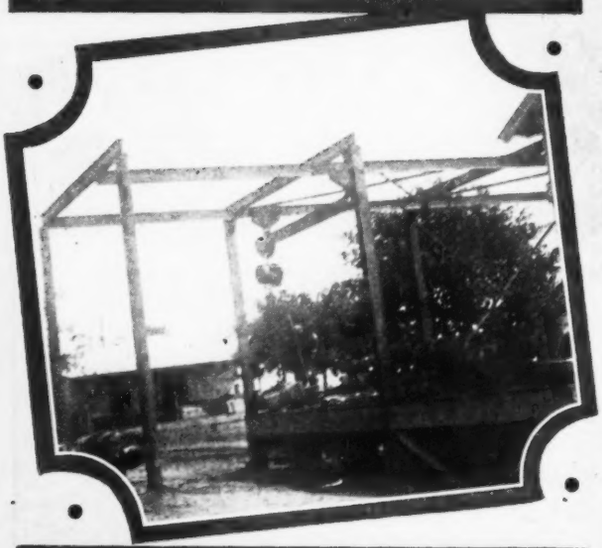
Hanlon - Waters, Inc.

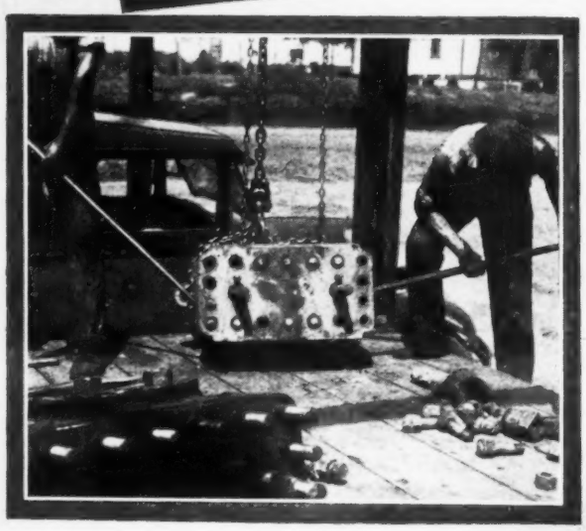
General Offices: Tulsa, Box 1404
Houston Fort Worth Midland, Texas

When writing the above advertisers, please mention The Petroleum Engineer

I. T. I. O. Maintains

Blow-Out Equipment Service Crew





Top to bottom—The shop. View of the extended crane track. Crew taking preventer apart.

THE Indian Territory Illuminating Oil Company maintains a special crew and house in the Oklahoma City field for the purpose of reconditioning its blowout-preventing equipment.

A building and special equipment has been installed for this purpose on the company's discovery lease in the pool, which is centrally located for all parts of the producing area. The house itself is quite small, being mostly a place to store the tools, grease, packing, nuts and bolts that may be needed in tearing apart and reconditioning these heavy pieces of equipment. But along one entire side and extending around one end of this house has been erected a dock that is much larger than the building. It is on this dock that most of the work is done by the crew of two men.

For the purpose of aiding in the handling of these heavy pieces an overhead-operated crane has been installed, with its track erected to extend over the dock on one end and out far enough over the edge to permit a truck to drive under. In loading and unloading the truck drives under this protruding portion.

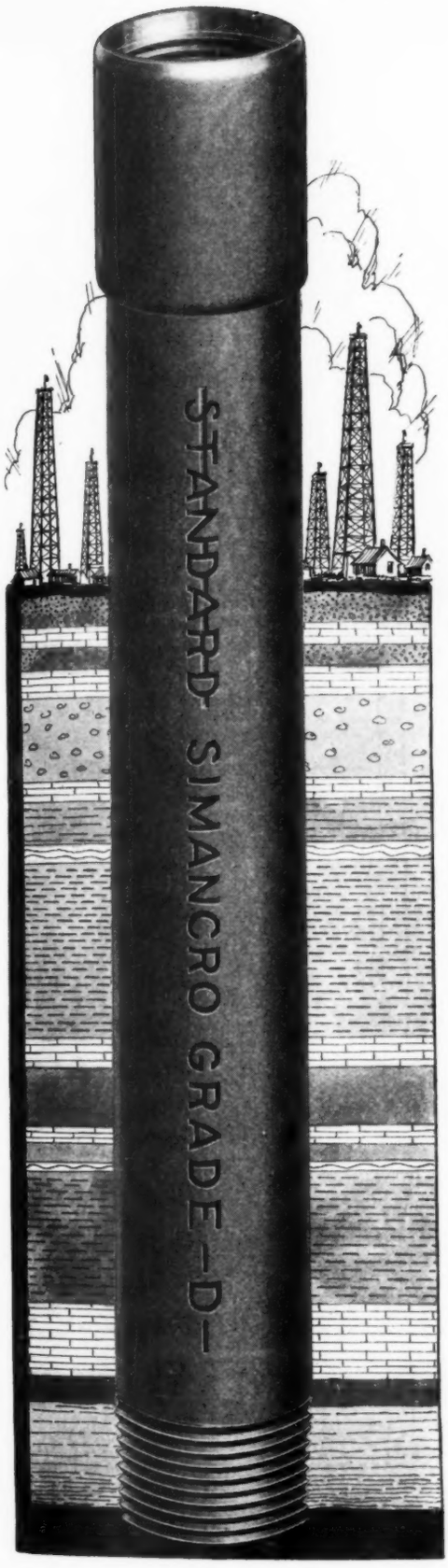
After being lifted to the dock the equipment is stored there until the crew can get to the particular piece of material. It is then torn apart, bolt by bolt, and carefully inspected. All worn parts are replaced. If it should need some attention that can be given only in a machine shop it is moved to the company's Oklahoma City machine shop, where the necessary repairs are made, then it is brought back to the blowout crew. After ascertaining that all the parts are in good condition comes the work of putting all the parts back in place and bolting the preventers back together again. On some of the larger blowout equipment pieces as much as an entire day is required for tearing down and reassembling.

The economy of the shop installation has been proven many times, not only in the saving of expense of replacing pieces of equipment that still have some service in them, but in always having preventers at this time in good order, ready for instant use if needed.

The decision to erect and maintain a blowout equipment shop and crew was decided upon by the company due to the great importance of these pieces of equipment in the Oklahoma City field. Drilling wells in this field, especially when in the process of completion, are a constant source of trouble, due to the high pressures encountered, that threaten to blow out the rotary mud and leave a wild blowing well on hand at any minute. For this reason, practically all the wells now being drilled in the field are equipped with blowout preventers. More than once they have proven themselves great savings by capping wells that otherwise would probably have left another Mary Sudik on hand.

From a half dozen to a dozen or more of different make preventers are usually on the docks of this shop. Most of these are waiting to be reconditioned, since the repaired ones are usually taken very shortly to the field, especially within the past month or more, when Indian Territory Illuminating Oil Company has been completing wells in big numbers.

The Oklahoma City field is the first in the Mid-Continent region where blowout equipment has been used to any extent, especially to the point of becoming practically standard equipment, and the blowout equipment service is a novelty.



DOWN!

DOWN!

DOWN!

Goes

SIMANCRO

New depths and new oil treasures are being safely reached with "Simancro"—the super-casing made especially for modern, deep drilling service.

"Simancro" is an alloy steel casing—an outstanding achievement in the art of modern metallurgy—so strong that you can drill to considerably greater depths than the limits of regular seamless casing and still enjoy the same factors of safety. Available in 95,000 pounds and 110,000 pounds minimum tensile grades.

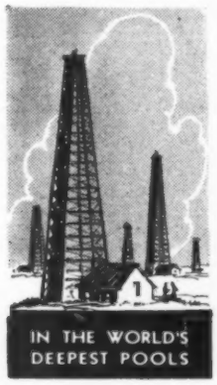
There is only one "Simancro"—an exclusive product of this company—specify it for utmost safety and dependability in deep drilling.

SPANG, CHALFANT & CO., INC.

General Offices: CLARK BUILDING, PITTSBURGH, PA.

Sales Offices: CHICAGO, ILL. NEW YORK, N. Y. ST. LOUIS, MO. PITTSBURGH, PA. TULSA, OKLA. LOS ANGELES, CAL.
Welded Mills: ETNA, PENNA. SHARPSBURG, PENNA. *Seamless Mills:* AMBRIDGE, PENNA.

SINCE 1828

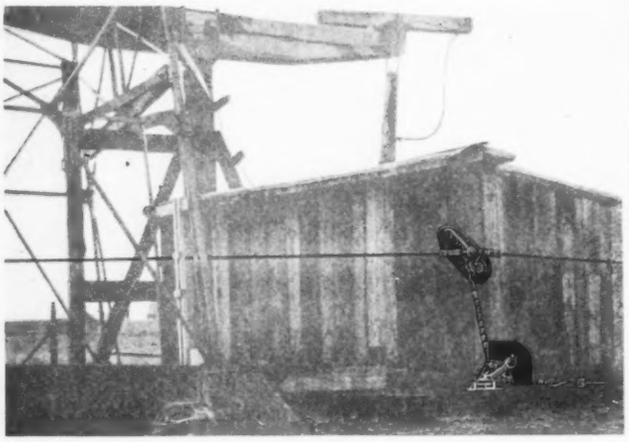


SPANG WELDED *and* STANDARD SEAMLESS OIL COUNTRY TUBULAR PRODUCTS

When writing SPANG, CHALFANT & CO., INC., *please mention The Petroleum Engineer*

Coles Standard Rig Power Unit

Converts rig into perfectly balanced power. Down-pull grips rig together. Keeps shaft in place. Rod line thru power deflector can take off at any angle. . . .

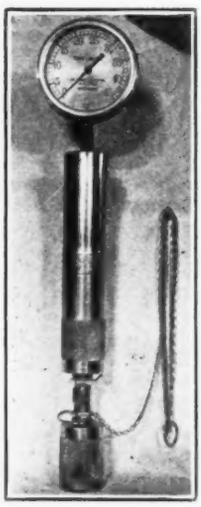


Rig Power Pumping Four 3,500-foot Wells, all at the same time, with 25-H. P. Gas Engine

See the Petroleum Engineer, August Issue, page 154, for illustrated descriptive article on this installation

Export Agent: Oilfield Equipment Co., New York

THE PRODUCING EQUIPMENT CO.
TULSA OKLAHOMA



See our Exhibits, Booths 8 and 9, Scientific and Technical Bldg., International Petroleum Exposition, October 4-11.

—ready for the new ruling?

Reid
Vapor Pressure
BOMBS
An AC-ME Product

With this Gasoline Bomb you can take samples under pressure. Equipped with a light chain for obtaining by immersion. Made of heavy brass tubing with polished nickel finish—well constructed, and a most serviceable instrument. With or without Test Gauge.

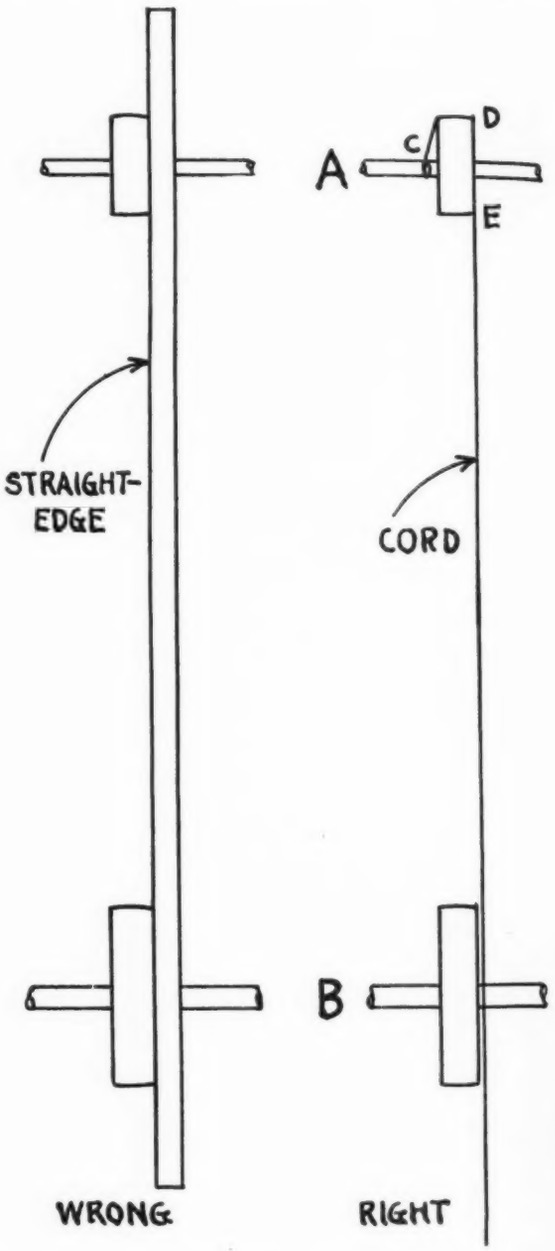
Write for booklet "14-P" and let us know your other requirements for scientific instruments.

The *Refinery Supply Co.*
621 E. 4th — TULSA, OKLAHOMA
Branch: 3404 Main St., Dallas, Texas.
Pacific Coast Representative:
Braun Corp., 363 New High, Los Angeles, Calif.

Suggested Methods of Aligning Pulleys

By A. F. SCHAPHORST, M. E.

HEREWITH is a sketch showing a method of aligning pulleys which is commonly used and which I have labeled "wrong." A long, slender pole or board is used as a straightedge in the manner shown. The method is all right, provided the straightedge is really straight, but nine times out of ten these straightedges are NOT straight. They may have every appearance of being straight, and yet they are crooked. Sometimes they are straight when



lying on the floor, but when lifted and supported at one end they deflect more or less and may become inaccurate and undependable. Therefore, don't use a long, slender pole, stick or board as a straightedge for aligning pulleys.

A method that assures true alignment is illustrated at the right and is labeled "RIGHT." Use a cord instead of a straightedge. I prefer a cord because cords are readily carried around in one's pocket and are available almost anywhere on a moment's notice. Then when pulled taut a cord is always perfectly straight with respect to a vertical plane. A cord does not warp.

For example, if we have two parallel shafts, A and B, and wish to align the pulleys on them, tie the cord to shaft A as at C, and hitch it around the pulley so that the cord makes contact at two points, D and E, almost diametrically opposite. When "just touching" E the cord is an accurate gauge for locating the pulley on shaft B. As indicated here, the pulley on shaft B will have to be moved to the right or the pulley on shaft A will have to be moved toward the left to secure proper alignment.

The pulleys marked "WRONG" have every appearance of being in perfect alignment, do they not? But they are NOT in line. The "straightedge" is not straight. Check it up and you will find that the straightedge is crooked.

Another method employed in installing machinery that is entirely too common is to simply "sight across" from pulley to pulley, place the machine at approximately the desired spot, and then shift the machine by the cut and try method until the belt stays on the pulleys.

The fact that a belt stays on pulleys isn't proof that the pulleys are accurately aligned. A tight belt on crowned pulleys will offset considerable misalignment, the belt will "stay on" and the drive will "look" all right. It is better practice to first align the pulleys accurately. Then the belt needn't be operated so tight. The belt will pull more, will operate more efficiently, and will last longer.

A thing to watch out for in the aligning of pulleys is "pulley wabble." It is obvious that if the pulley on shaft A is not on "square" the cord may not be exactly at right angles with the shaft. Therefore, it is always advisable to rotate the pulley and try the cord in several positions. If the pulley wabbles the cord will indicate various locations for the pulley on shaft B. In that event the "mean" position is the correct position on shaft B. That is, locate the pulley at the mid-point between the two extremes.

Of course, you must make certain that the shafts are parallel. Unless the shafts are parallel all of the above work will be of no avail. If they are not parallel, make them so.

Frank R. Seaver

Doheny Stone Opens Houston Branch

INITIAL unit of a branch factory of the Doheny Stone Drill Company of Los Angeles has been opened at Houston, Texas, Frank R. Seaver, Doheny executive, has announced. The branch is located in a large warehouse which has been remodeled and which, when completely equipped and in operation, will be the largest of the Doheny branches.

Invasion of the Mid-Continent area by the Los Angeles firm was brought about by the increasing demand for Doheny Stone Drill Company products throughout Texas, Oklahoma and Louisiana oil fields, Mr. Seaver states. Branches have been in operation for some time in Oklahoma City and Hobbs, New Mexico.

The parent factory occupies 40 acres at Torrance and is sending a large and complete exhibit for the International Petroleum Exhibition to be held at Tulsa, Okla., in October.

The Doheny Stone organization manufactures the Hydril oil well drilling equipment.

When a Gasoline Plant Has Fever

CALL the doctor. In the human body high temperatures represent a symptom; in a gasoline plant, a disease. In either case normal functioning cannot proceed where high temperatures exist.
With Campbell COOL-R-UNITS available, the high-temperature problem is eliminated. COOL-R-UNITS are multi-cellular (like the human cooling system). They can be installed as needed, cut in or cut out as conditions demand.
COOL-R-UNITS are welded construction, tested to a working pressure of 600 pounds . . . interchangeable, easily transported. Standard units are carried in stock ready to be installed on a few hours' notice.
COOL-R-UNITS are fully described in Bulletin No. 7. Ask for your copy today.

J. A. CAMPBELL CO.
Natural Gas Engineers
CONSULTING DESIGNING CONSTRUCTING
PHONE-416-93
P.O. DRAWER 669
LONG BEACH, CAL.

STEARNS-ROGER MFG. CO., DENVER
MID-CONTINENT AGENCY

For *Speed Pump* Regulation use this CF Compressor Regulator

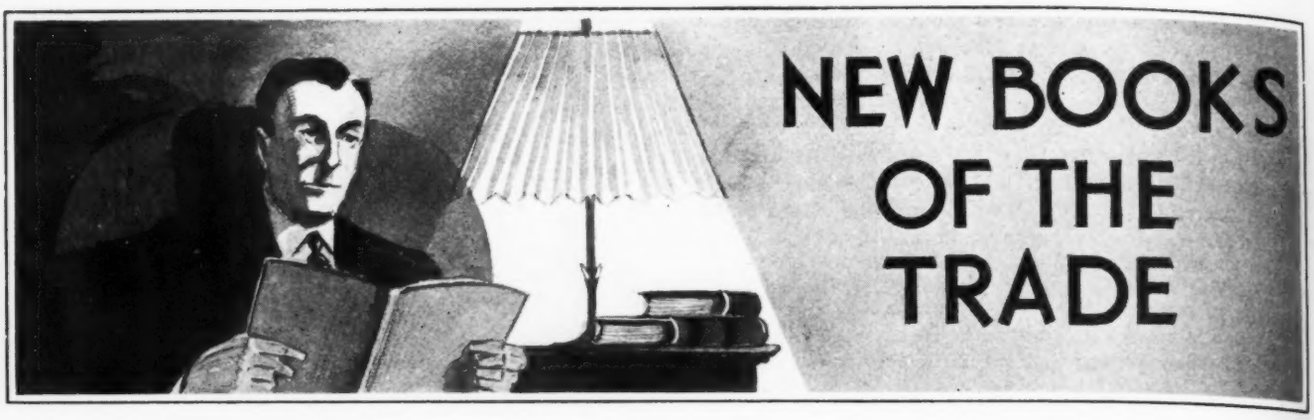
Necessary relief of excess discharge pressure is made sure and safe for the compressor operated at constant speed. . . . On low pressure gas compressors, constant discharge is held without affecting pressure of supply main, regardless of differential between main and discharge pressures. . . . Equally successful for steam as a back-pressure regulator. . . . Only means for close regulation of uniform pressure on electric-driven pumps. . . . Applicable for gas, air, steam and water.

The valve has a definite positive movement for a definite change in discharge pressure, and will remain indefinitely at some intermediate position between the wide open and closed position.

Excess discharge pressure flows through this regulator WITHOUT NOTICEABLE VARIATION.

Write for data pamphlet.

THE CHAPLIN - FULTON MFG. CO.
Manufacturers of Regulators for all Natural and Manufactured Gas Services.
28-40 PENN AVE. PITTSBURGH, PA.



The Hump Method for Heat Treatment of Steel

LEEDS & NORTHRUP COMPANY, Philadelphia, Pa., has issued its Catalog No. 90, entitled, "The Hump Method for Heat Treatment of Steel," 1930 issue.

This new issue is similar to the last edition, except that it contains on pages 10 and 11 a presentation of the problem of control of the rate of heating above the critical with the same precision as below it. The discussion of this problem is followed with an outline of its solution through the use of Leeds & Northrup Automatic Rate Control as applied to the Hump method of hardening.

Fire Prevention Booklets

THE American-La France and Foamite Corporation, Elmira, N. Y., has published four booklets on the killing of different types of fire. One of the books give the story of a test fire, in which a tank of high gravity crude oil was set afire. Another of the booklets describes the killing of fires resulting from electrical troubles. Other books contain facts on the latest methods of preventing Woeful Waste; Correction Protection Against Fire, and Modern Fire Fighting Methods.

Dopp Equipment Bulletin

THE Sowers Manufacturing Company of Buffalo, N. Y., has published a pamphlet on its Dopp Equipment, used in heating, cooling and mixing processes. The Dopp kettles used for these purposes are cast in one piece. There are no joints, no seams, bolts, rivets or welds.

These pamphlets describe how Dopp equipment is used and its many features that have been developed over a period of more than 50 years in working with heating, cooling and mixing problems in many branches of industry.

Hole!

HOLE! is the title of a book recently published by the Universal Engineering Company, Los Angeles, which is a contribution to the science of safe, straight and fast hole drilling. It has 59 illustrations and a total of 36 pages. This book may be obtained without cost by addressing the company.

Stoody Machinery Bulletin

THE Stoody Company, Whittier, Cal., has issued a bulletin on its machinery and equipment. This company manufactures two types and sizes of grinders, and boasts of the record that since the first grinder was put into service, several years ago, no grinder has ever worn out.

Specifications and illustrations of the grinders and motors are given.

Dean Hill Pump Bulletins

THE Dean Hill Pump Company, Anderson, Ind., manufacturers of pumping machinery and steam turbines, has issued three bulletins that describe a few of its pieces of equipment.

Bulletin No. 602 is about the company's Multi-Stage Centrifugal Pumps, which is a high-head or high-pressure pump, consisting of two or more stages, with each stage practically a separate pump, although in the same housing. Details of construction are given, with several illustrations, including a cross-section view.

The Wait Type Steam Turbines are described in the same manner in the company's bulletin known as No. 1202. This turbine is especially adapted to meet the requirements of modern plants using high pressure and temperature steam.

A small circular number 402 shows a cross-section of the Dean-Hill Double Suction Centrifugal Pumps, with the various parts named and their work explained.

Robinson Orifice Booklet

VARIOUS types of Robinson orifice fittings, manufactured by the Robinson Orifice Fitting Company of Los Angeles, are described in detail and illustrated in a new booklet being distributed by the company.

This booklet gives the purpose of the orifices and their advantages. It also gives list prices, sizes and dimensions.

Byron Jackson Pump Bulletins

BULLETIN No. 273 of the Byron Jackson Co., of Berkeley, Cal., describes the company's Multiplex Centrifugal pumps. These pumps are of the split case, multistage, volute type with diffusion vanes, designed to operate against high pressures with greater efficiency.

The company's Bulletin No. 293-A, deals with the Deepwell Turbine Pumps. The first Deepwell Turbine pump is pictured and its history given, while the remainder of the book describes the present types of Deepwell Turbines, their construction and performances.

Bulletin No. 295 is about the Type "S" Double Suction Single Stage Horizontally Split Case Centrifugal Pumps.

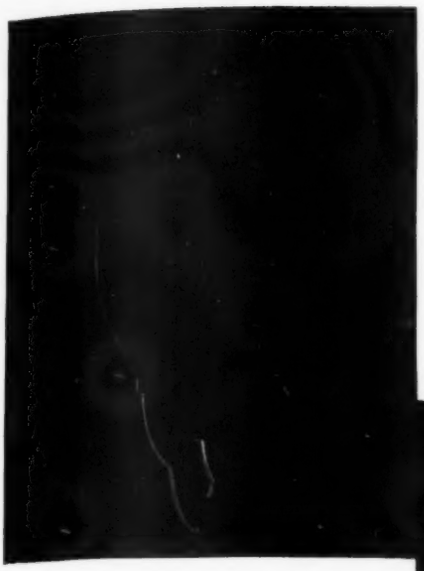
All of the bulletins are well illustrated and complete in details.

Success Is Largely a Matter of Choosing Wisely

THE Cooper-Bessemer Corporation, with main offices in Mount Vernon, Ohio, and Grove City, Pa., has published a booklet entitled, "Success Is Largely a Matter of Choosing Wisely." It is a reprint of a series of out-of-the-ordinary oil and gas field advertisements that are quite interesting.

WITH LIGHTEST OR HEAVIEST LOADS

Regans Travel *fastest*



Type 5-A, 3-sheave, 54"—for light drilling and tubing. Also made with 4 sheaves.

Type 5-A, 4-sheave, 62"—for light, medium and heavy loads. Also made with 3 and 5 sheaves.

Type 3-B, 5-sheave, 76"—for deep drilling and extra heavy loads. Also made with 4 and 6 sheaves.

Anti-Friction Bearings

Staggered Sheaves

Dual Bearing Application

Plenty of Weight

Fastest Operation

Rigid Construction

Protected Surfaces

Alemite Lubrication

3,4,5 and 6 sheaves

The right size of Blocks for your special needs.

Regan Forge & Engineering Co.
Oil Field Equipment
Plant and General Offices:
SAN PEDRO (Los Angeles Harbor) CALIFORNIA, U. S. A.

New York Office
75 West Street
Wm. Braat, Manager

Mid-Continent Office
Dallas, Texas
501-2 Marvin Building

Representatives

Oklahoma City, Okla.
2420 W. 21st St.

Pecos, Texas
P. O. Box 444

Maracaibo, Venezuela
Wm. Adams,
care Amer. Consul

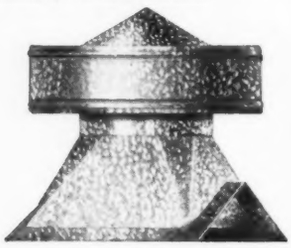
REGAN TRAVELING BLOCKS

When writing Regan Forge & Engineering Co. *please mention The Petroleum Engineer*

Southern Cornice Works

EVERYTHING IN SHEET METAL

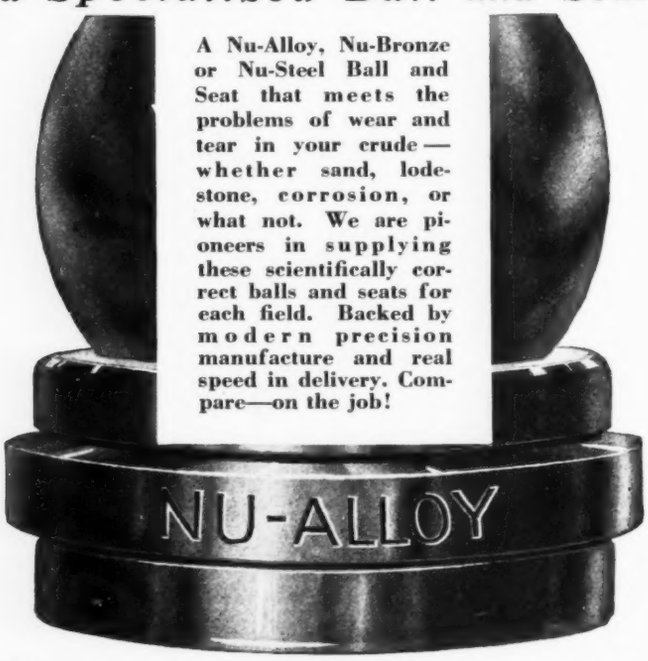
118-120 SO. CINCINNATI AVE.
TULSA, OKLAHOMA



Revolving and Stationary Roof Ventilators
Metal Adjustable Flues for Lease Houses
Water Well Tubing
Galvanized Storage Tanks for Drinking Water
Galvanized Iron Spouting That Your Lease Foreman Can Erect

SHEET BRASS, SHEET ZINC AND COPPER

For Your Own Problem— a Specialized Ball and Seat



A Nu-Alloy, Nu-Bronze or Nu-Steel Ball and Seat that meets the problems of wear and tear in your crude — whether sand, lodestone, corrosion, or what not. We are pioneers in supplying these scientifically correct balls and seats for each field. Backed by modern precision manufacture and real speed in delivery. Compare—on the job!

Petroleum Equipment Co.

OF TEXAS . . . . . INCORPORATED

PLANT AND OFFICE, FT. WORTH JON R. LONG, MGR.

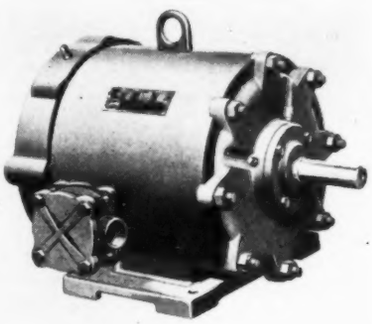
When the minutes count—within 2 hours after your order is received, your supply store can secure shipment of Nu-Alloy Balls and Seats.

There are other pumping equipment specialties in our catalog you ought to know about. Write for it.

Centrifugal Pump Selection Chart Bulletins

GOULDS PUMPS, INC., Seneca Falls, New York, are now distributing the second of its series of Centrifugal Pump Selection Chart Bulletins. This second book covers multistage pumps for capacities up to 2,000 G. P. M. and heads up to 2,400 feet. As with the first book, a comprehensive group of charts enables the prospective pump user to quickly and easily determine just what pump is best suited to his individual requirements. Complete description, including cross sections, bearing details and dimensions for each pump follow. Copies may be secured on request to the manufacturer.

Louis Allis Motor Pamphlet



THE Louis Allis Company, Milwaukee, Wis., is distributing a pamphlet known as No. 508, that shows its explosion-proof, self-ventilated, squirrel-cage electric motors. In addition to the description of the motors and illustrations, the bulletin has a report from the Underwriters Laboratories on a test conducted by the latter, and also shows illustrations and discusses various adaptions for use of the motors.

Flowing Wells Discussed

AN INTERESTING discussion of the utilization of gas energy in a well and how wells can be flowed by their own gas, is contained in a booklet just issued by the Williams Oil Well Flow Device, 1912 So. Gary Avenue, Tulsa. What the flow device is and its purpose are set forth in an interesting manner.

Paraffin in wells and how it can be reduced in wells flowing naturally by proper control and methods of using the gas, are treated at length. It is claimed that the device has been successful in confining paraffin trouble to the top five joints of tubing on a well which previously had given trouble with paraffin deposits all the way to the bottom of the tubing. Advantages of open and controlled tubing flow are discussed, and the improvement in sand conditions surrounding the well when a method of producing at a uniform desired rate of flow is followed is pointed out.

Illustrations of the details of the device unassembled and also the method of installation in a well are given in the booklet, which should prove of interest to field men.

Blasters' Handbook

THE Explosives Department of E. I. du Pont de Nemours & Company, Inc., of Wilmington, Delaware, has prepared, under the direction of Arthur LaMotte, manager of the Technical Section, a handbook for blasters that describes practical methods of using explosives for various purposes.

The book is more than 200 pages and well illustrated with pictures, drawings and charts. It describes how explosives should be properly stored, carefully handled and properly used.

The book should be most highly interesting to anyone

interested or using explosives and the many cases cited in the book should be of value as well as the general constructive paragraphs.

Tubing Control Head Book

THE Cameron Iron Works has issued a new book on its tubing control heads. This new booklet contains complete instructions for the operation of these heads as well as details of their construction. It is an exhaustive study of the uses and application of these heads for high-pressure work.

The tubing control heads are made in two sizes, the extra heavy duty and the standard type. With them tubing may be snubbed against pressure, the well may be brought in through tubing; they serve as part of the well manifold with the tubing suspended on the trams in the control head and they also allow washing the well through the tubing.

Its use on a producing well allows any tubing jobs to be performed.

A copy of the new booklet may be had by writing the Cameron Iron Works, Houston, Texas.

Automatic Arc Welding Booklet

AUTOMATIC Arc Welding by the Electronic Tornado Process," is the title of a very complete and attractive 40-page booklet, publication of which has recently been announced by The Lincoln Electric Company, Cleveland, Ohio, manufacturers of "Stable Arc" Welders and "Linc-Weld" Motors.

This new booklet contains a host of valuable information on automatic welding with carbon arc, and describes in detail the features of this process. Results of tests of strength and ductility are tabulated and fully described, as well as other tests which have been made by The Lincoln Electric Company. Other interesting pages show the application of the Electronic Tornado in various industries and record in detail the speed and costs attained by using this modern method of manufacturing.

Liquidometer Measuring Pamphlets

THE Liquidometer Corporation, Long Island, N. Y., has issued several bulletins describing the many models of its measuring devices and telling the various uses for the measuring machines.

The tank contents is indicated automatically on an easily read dial, with no manual operation required.

Extinguishing of Oil Fires With Fog

A NEW catalogue embracing an entirely new idea for the prevention and control of fires, especially oil fires, has recently been issued by the Rapid Construction Company, 5631 South Riverside Drive, Los Angeles, California. This interesting, 12-page catalogue, is the first ever written on the use of water in fog form as a destroyer of fire, the company states.

The Rapid Equipment described, according to the contents of the catalogue, will by the conversion of water into millions of fine fog particles, destroy the most vicious fire or conflagration in a few seconds. This includes fires in derricks, tanks, refinery units, etc.

Moroil Stuffing Box and Tubing Support

THE Bridgeport Machine Company of Wichita, Kansas, has recently published two pamphlets. One gives the advantages of design and construction of the Moroil shot packed Stuffing Box, showing a cross-cut picture of it. The other pamphlet describes the Moroil Patented Tubing Support, and its principles are fully described.

The ACME B. & R.

KING
Of Wire Line Drilling
Clamps

On sale at the Leading Supply Stores

Manufactured by
Acme Fishing Tool Company
Parkersburg, W. Va.

Quasi-Arc
COVERED WELDING RODS

QUASI-ARC Electrodes are unequalled for boiler welding or other work subject to stresses at high temperatures and for joints requiring high resistance to shock and fatigue caused by alternating stresses. Write for technical folders describing the unique features of Quasi-Arc welding.

For Better Welds

QUASI-ARC INCORPORATED
11 West 42nd St., New York
Representatives in 27 of the World's Largest Industrial Centers

For Sale . . .

The following pipe line equipment. All equipment has been thoroughly overhauled, painted and put in first-class condition.

3—Ingersoll-Rand 7 x 6 Type 20 Air Compressors
8—250 gal. capacity Paint Pots
4—Model 36 Buckeye Ditchers
6—Lincoln Arc Generators
4—Oxweld Generators—Style 100 M. P.
7—Fordson Tractors equipped with full crawlers and booms
3—"30" Caterpillars equipped with bulldozers

Tents, flies, blankets, iron cots, Frostkiller heating stoves, kitchen ranges, cooking and tableware.

Uinta Pipe Line Company
P. O. Box 2264 Salt Lake City, Utah

NEXT MONTH'S ISSUE

NEXT month's issue of The Petroleum Engineer will be out on October 3rd, publication date having been advanced to permit of distribution of copies at the Seventh International Petroleum Exposition to be held in Tulsa, Okla., October 4 to 11. With an exceptionally fine line-up of appropriate editorial matter, the October number will gain extraordinary attention. Manufacturers who have not arranged to be represented by an advertisement in it should do so at once.

The Petroleum Engineer

» » Oil Field Machine Shop Adapted for

A NEW machine shop of the most modern and best equipped type in the Mid-Continent area has recently been placed in operation by the Indian Territory Illuminating Oil Company in the Oklahoma City district. The shop is operating on a full 24-hour basis, employing a force of 35 workmen.

Efforts will be primarily toward providing a plant for salvaging and reclaiming of used materials. However, due to the efficiency of the equipment and experience of the workmen under supervision of Foreman P. J. Wines, considerable new equipment is also being made.

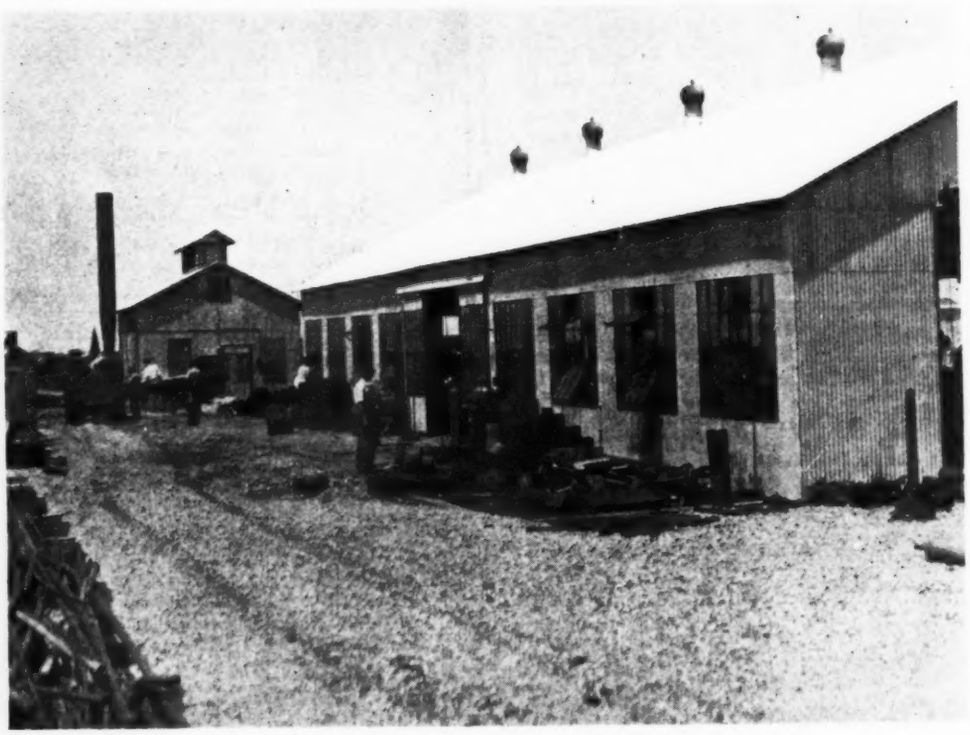
P. J. Wines, foreman.

This company late in the Seminole district activity period started a reclaiming plant in that area. As its economical success was shown it was enlarged until capable of a very large turnout. In building this new plant at Oklahoma City all the knowledge gained at Seminole was used to improve conditions in every way possible. The new machine shop is much larger and more modern than the Seminole plant. That it should be was necessary, due to the greater activity of the company in the Oklahoma City field and to the more gruelling service it is called upon to perform in the latter area. When a piece of equipment is returned from the field to the machine shop it is first given a preliminary classification. This is for the purpose of deciding whether the equipment is suitable for further use. If suitable, it is then cleaned by hand or with a sandblast. The next step is an inspection to determine its salvage value, after which it is sent to the shop if it is thought suitable for reconditioning, otherwise it is sent to the junk pile.

In the machine shop each piece of equipment is disassembled and inspected, then repaired or new parts put in. It is then reassembled and repacked for future use, after which it must be tested to determine any leaks or other defects. A pressure pump capable of building up 6,000 pounds of pressure is used for the testing. If leaks are found it is reconditioned again, but if found okeh it is painted and delivered to the company's warehouse, where it will later be sent back to the field.

A feature of the operation of the shop is the method of removing rust and dirt from the equipment. One small room is equipped with a blast and known as the sandblast room. An operator, suitably clothed to prevent being cut by the flying sand, sees that the sand cuts all of the rust, etc., off of the materials. Another feature of the plant is a home-made tumbler used for cleaning small fittings, etc. This is motor-driven. A number of small fittings may be placed in the machine, which is practically nothing but a kettle that is revolved. Sand being forced into this kettle under pressure cleans the material within. It is located just outside the blast room in a small, compact steel structure just large enough to contain the kettle.

Units of the plant are the shop proper, storage docks, sandblast room, boiler room, compressor building and office. The steam from the boiler is used for cleaning fittings that are not in bad condition, and also in clean-



General view of shop, showing boiler house, which contains sand blast room in background.

Reconditioning PRODUCTION MATERIALS « «

ing the docks and machinery equipment, as well as operating the test pump and in heating the building. The compressor operates the sandblast and is connected with each machine in the shop for blow-cleaning.

The shop proper consists of a steel frame corrugated iron building 40 x 100 x 14 feet. In its planning a major consideration was the lighting and ventilation conditions. A great amount of window space was given for this purpose, and each machine placed to give its operator the best advantages of the light.

Equipment in the shop includes a 30-inch lathe with a 20-foot base, one 18-inch lathe with an 8-foot bead, one 28-inch shaper, two 32-inch radial drills, a 2-inch combination bolt and pipe machine, 4 and 12-inch pipe machines, a grinder, a 6 x 6-foot hacksaw, hydraulic pipe straightener, two air valve grinders, a 60-ton hydraulic press, and a 6⅝x6 test pump. All machines are direct motor-driven with individual motors fed through a conduit under the floor. These machines are all spaced to give as large amount of empty floor space as possible.

For storage purposes a concrete dock covering 1,300 square feet runs alongside of the main building, while at one end another storage dock covering 2,862 square feet has been constructed. These care for the equipment, such as valves and small fittings that are to be reconditioned, while the pipe, casing and tubing are stored in a portion of the warehouse yard at the other end of the machine shop. In the pipe yard a hand-operated overhead crane, with a capacity of two tons aids in the handling of equipment.

The office crew, housed in a small building near the machine shop, keeps track of all equipment going into the shop and its destination when taken from the shop. The amount of equipment handled each month is reported.

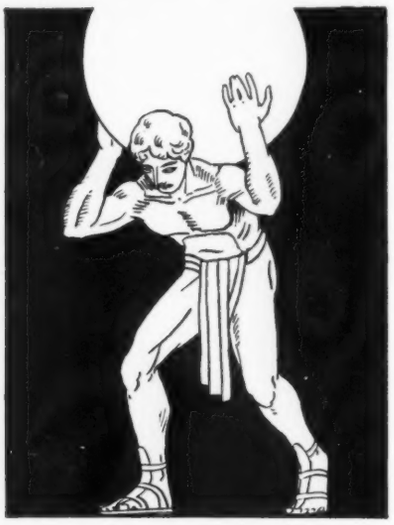
This shop is in the big I. T. I. O. warehouse yard at Oklahoma City. It is but a few yards from the several warehouses and storage docks. This saves hauling and transferring of the equipment over a long distance when it has passed the machine shop tests in moving it to the warehouses ready for shipment to the field crews for use again.

Although a new unit of the company, and considered quite sufficient at the time of construction, plans are being made, according to P. J. Wines, foreman, for the additional improvement and enlargement of the shop.

Home-made cleaning tumbler.

The sand blast machine.

Rear view of shop, showing pipe yard and heavy crane track.



. YOU MAY HOLD US RESPONSIBLE FOR PRODUCTION

There need be no uncertainty about the quality or quantity of product you may expect from a new plant or from the modernization of your present plant . . . not if you let the Whealton & Townsend organization shoulder the entire responsibility for your production.

Our **Complete** Service begins with laboratory analysis of oil, gas and processes to insure quality in the finished product, includes skilled designing and engineering of a plant that anticipates tomorrow's needs and is completed by entire construction handled at prearranged cost and within a specified time. We guarantee the quality and quantity of products to be produced.

It is a service that assures satisfactory production at low cost, resulting in bigger profits.

WHEALTON & TOWNSEND, INC., LTD.

Turn-Key Service — Engineers

Embracing Plant Designing, Plant Construction, Plant Rebuilding, Consultation, Management, Laboratory Service, Field Research.

Subway Terminal Bldg., Los Angeles – 120 E. Brady Street, Tulsa, Okla.

"Save thru Skill"

When writing WHEALTON & TOWNSEND, INC., *please mention The Petroleum Engineer*

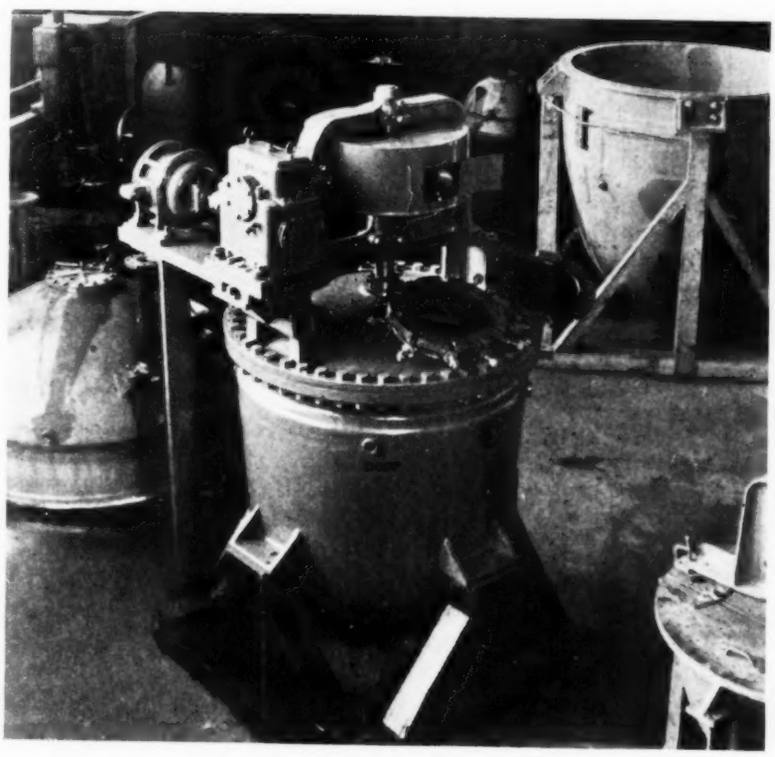
Lead Soaps as Constituents *of* Lubricating Greases

By A. R. LANGE, *Chief Chemist and Production Manager, Swan-Finch Oil Corp.*

LUBRICANTS containing lead soap or lead glyceride have become popular in recent years for use in transmissions and differentials of automobiles, due to their peculiar cushioning effect on gears and their low coefficient of friction. Some of these soaps combine readily with lubricating oils and can be added in larger proportions than other metallic soaps without materially changing the physical properties of the oil.

Lead soap lubricants have been used for many years for various purposes, as for instance in railway car journals, but the literature, as far as the author has been able to determine, is very limited.

Lead soaps have been made for medical use (lead plaster) many years, but have been manufactured from a soluble soap by the addition of a soluble lead salt, by treating a fatty acid with litharge, and by treating a glyceride with litharge, so that lead plaster is a variable product. Dussaunce in his book on fats (1869) states that glycerine was first noticed by boiling olive oil and litharge in the presence of water in the manufacture of lead plaster.



Mixing kettle in a modern grease plant.

Lead oleates, resinates and linoleates have been used for years as driers in varnish and paints, in the manufacture of linoleum, and in the rubber industry, but we find very little regarding their composition until quite recently, when they came into use as lubricants for automobiles.

In 1926 Van Gundy obtained a patent (U. S. 1,594,762) for making a normal lead oleate by heating oleic acid and litharge to a temperature not lower than 525 degrees F. or higher than 530 degrees F., claiming that at lower temperatures a basic salt is formed that is more or less insoluble in mineral oils, and that also increases the cold test of the oil considerably, whereas the normal salt is easily soluble and decreases the cold test of the mineral oil by preventing the crystallization of the wax.

Diggs & Campbell in their excellent paper read before the annual meeting of the Petroleum Institute, "Chemistry of Lead Soaps," discussed the whole question of lead compounds, but did not find that either basic or normal lead oleate have this effect, but that both gel mineral oil. They also determined that with a low acid menhaden oil the litharge combined with the oil without the liberation of water, aldehydes, or glycerine, and in the proportion of 3 mols of litharge to one of glyceride. This product was found to be soluble in mineral oils. They also determined the molecular weight of this lead glyceride and its formula.

The author quite agrees with the conclusion reached by Diggs & Campbell, but finds that litharge adds to an unsaturated fatty oil similar to the oxidation or sulphurization of such a product—namely, the temperature determines the speed of reaction and also decomposition.

It is difficult to keep litharge suspended in a finely divided state with the ordinary mechanical agitation, but it is possible to produce a lead glyceride containing the usual amount of lead oxide by heating litharge and a low acid fish oil at a temperature of 280 degrees F. for 20 hours. As the process was not continuous, quite some oxide settled out on standing over night, which then could not be made to react again.

It is also true that the speed of reaction is not the same for all unsaturated fats at the same temperatures, and this seems to have no bearing on the iodine number, as linseed oil will take up litharge much more slowly than will fish oil.

At high temperatures, 450-550 degrees F., considerable decomposition takes place with persistent foaming, and, although no attempt was made to determine the decomposition products, there were evidences of water, carbon monoxide, or hydrogen.

There is great need at present for more light upon this lead soap and lead glyceride question, their solubilities in different mineral oils at all temperatures, and their effect upon the degree of foaming and holding of air when used in differentials.

It has also become customary in differential greases to use an unrefined residual oil, such as zero black oil, because of the economy, but it seems a fallacy to incorporate into such an oil a compound as expensive as a lead soap or glyceride, and then expect such a grease to pass the chemical and physical tests demanded by many users.

Straight Hole

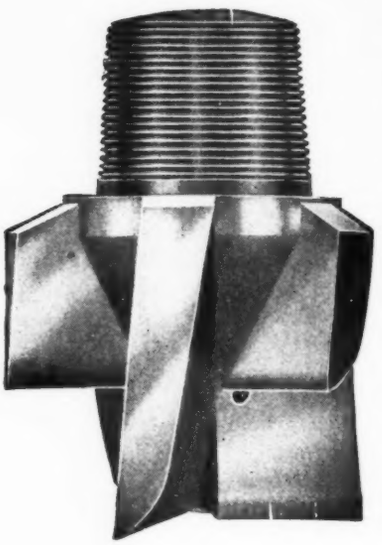
all the way down

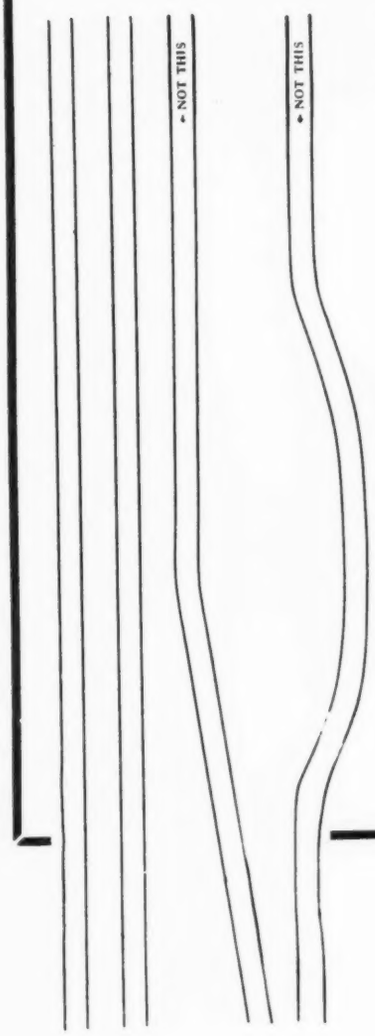
Brewster

A.P.I. Straight Hole Rock Bit is primarily designed to cut a straight hole.

Straight hole drilling is nine-tenths in the design of the bit. Pilot blades at bottom, reaming blades above—this is a scientific design, backed by precision manufacture in skillfully manned and splendidly equipped shops.

Ask any user about results.

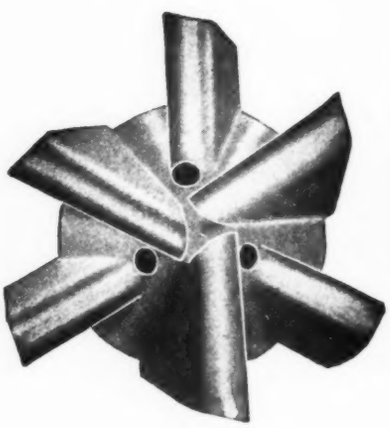




—Also

These Other Brewster Products

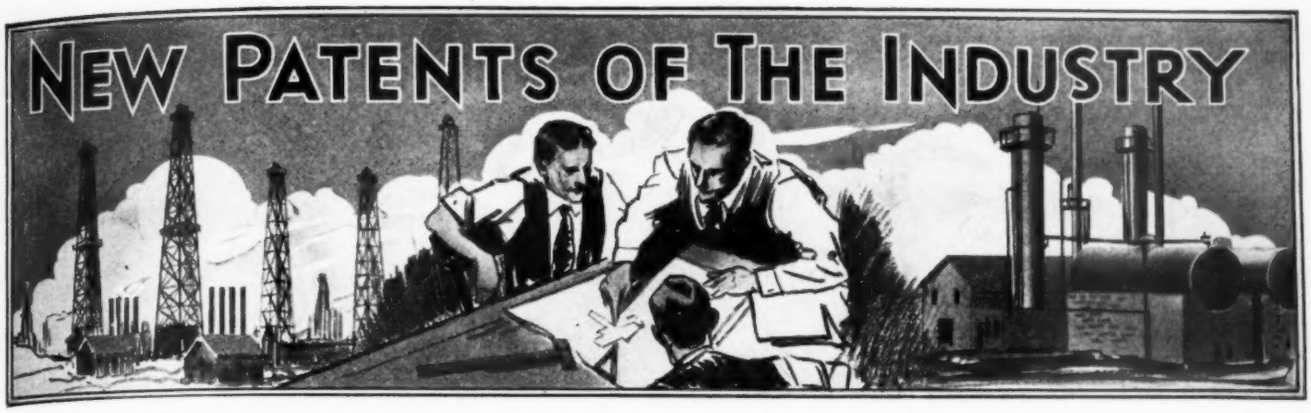
Straight Hole Bits; A.P.I. Shouldered Tool Joints; Chrome Nickel Drill Collars; Six Blade Rock Bits; Special Fish Tail and Gumbo Bits; Core Barrel Cutter Heads for both hard and soft formations—hard formation cutter heads are faced with a substance of diamond-like hardness.

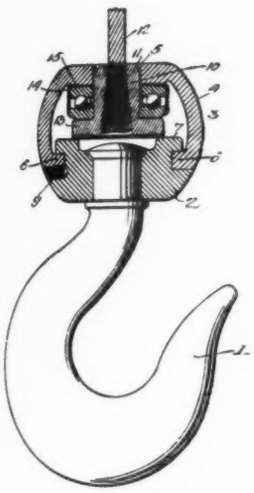


The Brewster COMPANY~INC.
SUCCESSORS TO OIL CITY IRON WORKS INC.
Shreveport, Louisiana

COMPLETE STOCK carried at these warehouses: Iverson Specialty Co., Oklahoma City, phone 2-2833; Houston Store, 2000 Harrington St., phone Capitol 3021. Distributors: Wilson Supply Co., Houston, Beaumont and Luling, Texas; Continental Supply Co., all stores; Murray-Brooks Hardware Co., Lake Charles, Louisiana; T. T. Word Supply Co., Houston, Texas, and Lake Charles, Louisiana; El Dorado Foundry, Machine & Supply Co., El Dorado, Arkansas.

NEW PATENTS OF THE INDUSTRY





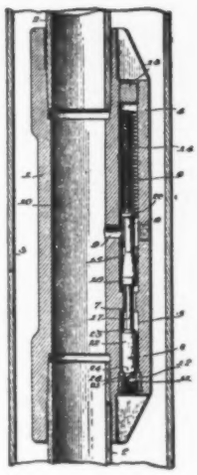
1,773,045. SWIVEL HOOK. CHARLES VERNON KOONS, Philadelphia, Pa., assignor to American Engineering Company, Philadelphia, Pa., a Corporation of Pennsylvania. Filed June 29, 1929. Serial No. 374,899. 4 Claims. (Cl. 294—82.)

1. In a swivel hook, the combination with a two-part housing having a top opening, of a hook permanently fixed in one of said parts, interlocking means in said parts releasable by a relative rotary movement of said parts through a small angle, releasable means for preventing said relative rotary movement, a supporting member extending into the casing through said opening, and an anti-friction bearing carried by said member and constituting a support for the casing.

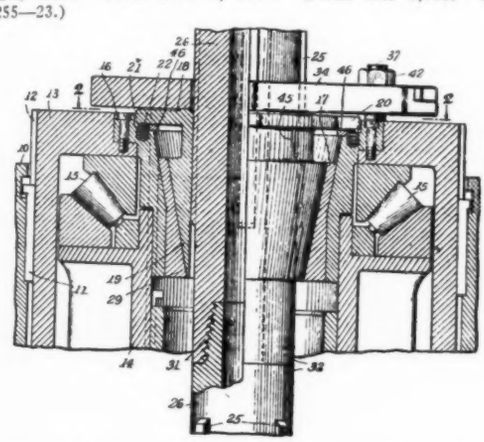
1,772,036. AUTOMATIC STAGE-LIFT FLOWING DEVICE. ALEXANDER BOYNTON, San Antonio, Tex. Filed Oct. 5, 1927. Serial No. 224,205. 17 Claims. (Cl. 137—111.)

8. A valve comprising a body having a passage with an inlet, an outlet and an intermediate seat and a constriction in the passage at one side of the seat, and a valve device in the passage having a valve element coacting with the seat and a throttling element reciprocable in the constriction with a plunger action.

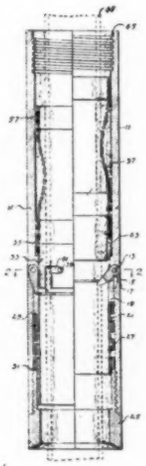
13. A valve comprising a body having a chamber with a seat, a valve device having a valve element in the chamber, and a threaded neck having a screw-driver slot for both screwing said neck into a threaded opening in said element and grinding said element upon the seat.



1,772,368. WELL-DRILL ROTARY TABLE. WALDO SHELDON, South Norwalk, Conn. Filed Feb. 3, 1925. Serial No. 6,535. 32 Claims. (Cl. 255—23.)



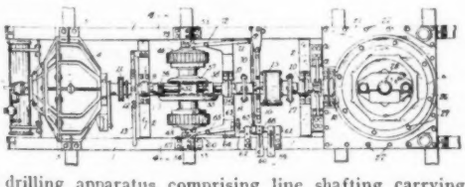
1. As an article of manufacture a drill stem drive collet having a cylindrical passage therethrough grooved to receive the ribs or corners of a grief stem, said collet being made of spring material and slotted to divide the same into resilient sections.



1,772,085. PIPE-CUTTING TOOL. ROWLAND O. PICKIN, Los Angeles, Calif. Filed Feb. 28, 1929. Serial No. 343,431. 10 Claims. (Cl. 81—189.)

1. In a tool for cutting pipe and for like purposes, a body, a cutter mounted therein, a cutter feeding member, a normally compressed spring for operating the cutter feeding member, said spring being normally compressed before the tool is inserted into the well, and a cutter restraining and releasing member slidably mounted between the cutters and the axis of the tool and having frictional contact with the pipe to be cut, said cutter restraining and releasing member being operated by a turning movement of said body for the purpose of allowing the said spring to force the cutter into contact with the pipe to be cut.

1,772,370. HOISTING APPARATUS. WALDO SHELDON, South Norwalk, Conn. Filed May 5, 1926. Serial No. 106,849. 32 Claims. (Cl. 254—185.)



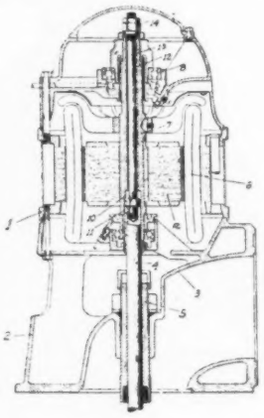
1. Well drilling apparatus comprising line shafting carrying oppositely faced bevel gears, bevel gears of different diameters driven at different speeds but in the same direction by said first named gears, different speed clutches operated by the driven bevel gears, hoist mechanism, gearing connecting said clutches with said hoist mechanism and means for arbitrarily controlling the different speed clutches.

1,772,692. EXPANDING MANDREL. EDWARD E. STEVENSON, Los Angeles, Calif., assignor to Emsco Derrick & Equipment Company, Los Angeles, Calif., a Corporation of California. Filed Jan. 19, 1929. Serial No. 333,565. 11 Claims. (Cl. 29—88.2.)

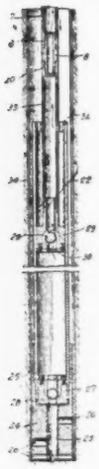
1. In an expanding mandrel, the combination of: a support; an independently operable primary expansible means on said support; an independently operable secondary expansible means on said support; primary expanding means for expanding said primary expansible means; and secondary expanding means operable independently of said primary means for expanding said secondary expansible means.

1,772,778. DEEP-WELL TURBINE-PUMP DRIVE. Roy M. Magnuson, Stockton, Calif., assignor to Sterling Pump Works, Stockton, Calif. Filed March 25, 1929. Serial No. 349,673. 4 Claims. (Cl. 103—102.)

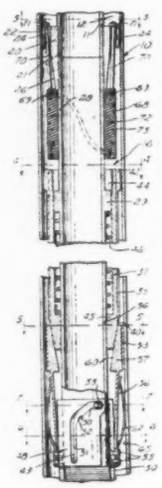
1. In a deep well turbine pump drive, a pump shaft, a drive shaft vertically alined with the pump shaft and being bored out at its lower end to slidably receive the upper end of the shaft therein in driving relation therewith, and a tension rod projecting upwardly through the drive shaft from and connected to the pump shaft, and means supporting said rod from the upper end of the drive shaft.



1,772,369. WELL-BAILING PUMP. Waldo Sheldon, South Norwalk, Conn. Filed Aug. 1, 1925. Serial No. 47,599. 1 Claim. (Cl. 103—188.)



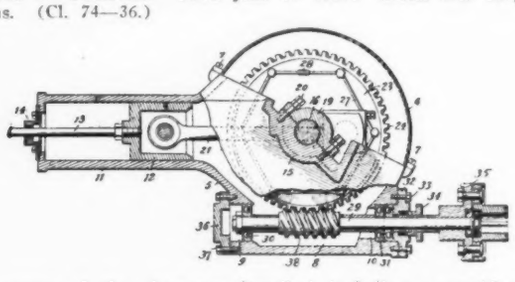
A pumping combination for rotary drilling equipment, comprising a pump barrel, an upwardly opening standing valve in the lower end of said pump barrel, a weighting shoe attached over the lower end of said pump barrel and over the standing valve located therein, said weighting shoe having a longitudinal passage opening directly to said standing valve and a lateral branch passage or passages in communication with said first passage for taking off oil at a desired level or levels above the bottom of the hole in which the shoe is rested, a piston operating in the pump barrel and having an upwardly opening valve to pass the oil on the down stroke of the piston, a hollow piston rod connected to said piston operating out through the top of the pump barrel and having one element of a rotary tool joint and a string of drill pipe having the companion element of a tool joint and thereby connected with said hollow piston rod.



1,772,682, PACKER. John T. Phipps, Huntington Park, Calif., assignor of one-fourth to Mattie M. Newcomb. Filed Dec. 28, 1927. Serial No. 243,039. 15 Claims. (Cl. 166—12.)

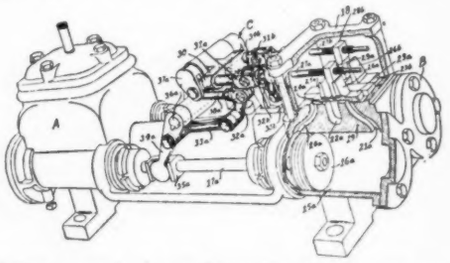
1. In a packer, the combination of: an annular resilient packing member adapted to be disposed in the space between a casing and a tubing inserted therein; relatively stiff reinforcing members spirally embedded in said packing member; means for expanding said packing member to form a seal in said space; and means for contracting said packing member by drawing upon said reinforcing members.

1,772,136. PUMP. Thomas James Flanagan, Tulsa, Okla., assignor to Gaso Pump and Burner Manufacturing Company, Tulsa, Okla., a Corporation of Oklahoma. Filed Jan. 11 1927. Serial No. 160,489. 2 Claims. (Cl. 74—36.)

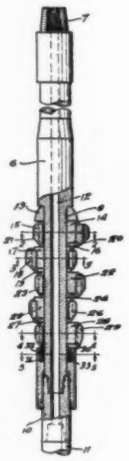


1. A pump of the character described including a combined crank case and gear housing having a cylinder formed integral therewith, said crank case and gear housing having an opening providing side portions having bearings formed on the upper surface thereof and positioned inwardly of the outer surfaces, said bearings being open at the top, a crank shaft removably and rotatably supported in the bearings with its ends covered by the sides of the case and housing.

1,772,121. VALVE MOTION FOR DUPLEX PUMPS. Gottlieb W. Volz, Long Beach, Calif., assignor to Volz Engineering Corporation, Long Beach Calif., a Corporation of California. Filed March 7 1928. Serial No. 259,673. 3 Claims. (Cl. 121—116.)

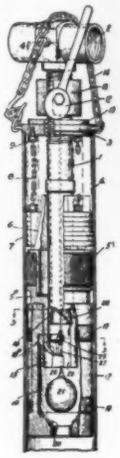


1. In a duplex pump having reciprocating plunger mechanism, a duplex reciprocating motor for reciprocating said plunger mechanism, including valves for each motor member; control mechanism for said motor actuated from said motor mechanism including a lever for operating each valve, each level being connected at one end to a valve to operate the latter, being connected at the other end to one of the members of said plunger mechanism to produce a component of oscillatory movement and being connected intermediate said ends to the other member of said plunger mechanism to produce a component of oscillatory movement and said plunger mechanism thereby producing composite motions whereby to alternately cause normal displacement of the plungers at intermediate portions of their strokes and overlapping of their strokes at the ends to effect cumulative normal displacement of said plungers.



1,772,491. UNDERREAMER. Ernest Koppl, Long Beach, Calif. Filed Apr. 2, 1928. Serial No. 266,695. 17 Claims. (Cl. 255—73.)

1. An underreamer comprising a journal carrying member in longitudinal alignment with the drill string by which it is to be rotated and having a journal thereon, and a roller cutter having an eccentric bearing on said journal to rotate in a plane transverse to the axis of said member so as to cause a throw in its rotation.

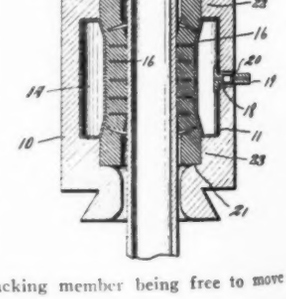


1,772,871. WELL CEMENTING. John W. MacClatchie, Compton, Calif. Filed Oct. 22, 1928. Serial No. 313,997. 20 Claims. (Cl. 166—1.)

1. In combination, a closure head for a well adapted to supply fluid to the well, a plug having a normally open bore and releasably suspended in the head below the point of said fluid supply for unobstructed flow of said fluid into the well, and means for closing said bore by releasing the plug.

1,772,210. CASING-HEAD PACKING AND OIL SAVER. Charley E. Dale, Barnsdall, Okla. Filed July 7, 1927. Serial No. 204,099. 1 Claim. (Cl. 286—26.)

A casing head packing comprising a cylindrical body adapted to be mounted on a casing head of a well, the body being annular in cross section and formed to provide an annular recess less in length than the body, the upper and lower ends of the recess being defined by annular shoulders, the lower end of the body extending inward beyond said lower shoulder to form a packing seat, an annular pneumatic hose disposed within said recess and having means whereby it may be inflated or deflated and an annular packing member disposed within the hose and longer than the hose and having its ends resting against the inner faces of said shoulders and the lower end resting upon said seat, the upper end of the annular packing member being free to move longitudinally of the cylindrical body.



The Non-Mechanical, Whirling, Swirling, Spiral Flow Through the New Baker Cement WHIRLER Shoe Gives a Much More Efficient Cement Job « «

You know from experience how important it is to get a satisfactory cement job on the first trial. Retrials are difficult and expensive.

That's why this new Baker Cement WHIRLER Shoe is of extreme importance to you. Its whirling, swirling, spiral flow of cement assures perfect coverage of the entire area to be cemented—and eliminates the chance of channeling.

An important element is that its action is entirely automatic and NON-MECHANICAL, which eliminates any possibility of the Shoe failing in its functions.

Another important fact is that the entire inner construction of this Baker Cement WHIRLER Shoe is NON-METALLIC. After the cement is set and ready for drilling out, the Shoe can be drilled out and its non-metallic elements circulated away.

This accomplishes two things: First, the hole is perfectly clean for any operations to follow. No fragments of cast iron valves or guides to be side-tracked or otherwise disposed of, thus eliminating a large amount of trouble.

Second, and important, is this: All chance of breaking the cement bond and nullifying the cement job while drilling out cast iron is eliminated, for there is no metal to be drilled out.

Still another feature is that even though the Shoe be leaning against the formation, circulation will not be restricted at any of the four slots or ports.

Full information regarding these two new and important Baker Cement WHIRLER Shoes is yours for the asking.

Export Sales Office:
Room 736, 25 Broadway
New York, N. Y.

Stocks of Baker Tools and Equipment are carried by Dealers in all active fields.

BAKER
OIL TOOLS, INC.
Main Office and Factory
Box L, Huntington Park, Calif.

California Branches:
COALINGA TAFT BAKERSFIELD SANTA BARBARA

Mid-Continent Branches:
220 E. Brady St.,
Tulsa, Okla.
2301 Commerce St.,
Houston, Texas

Full stocks and immediate Service are always available

TALK NUMBER NINE BY A PROMINENT DISTRIBUTOR

"Here's Another Way We Help You to Save

Above—Mr. Irvin Reed, President and Manager of the Pacific Coast Rubber Company of San Francisco, California. This company's services are of a definite economic value to the prosperity of its business territory.

OUR salesmen become better acquainted with local conditions than any manufacturer's salesman—they understand what is needed and wanted—they appreciate and sympathize with individuals and companies—they understand our locality because they and their families are local—they are as smart and efficient in your behalf as any set of men—and—they recommend Republic's Belting—Hose—Packing—Molded and Lathe Cut Goods."

The above statement is characteristic of those made by prominent distributors all over the country. It explains in part how the Industrial Supply Distributor, helping to solve the important problem of broad markets and economical distribution, upholds high quality, maintains fair prices and saves needless efforts on the part of both consumer and manufacturer.

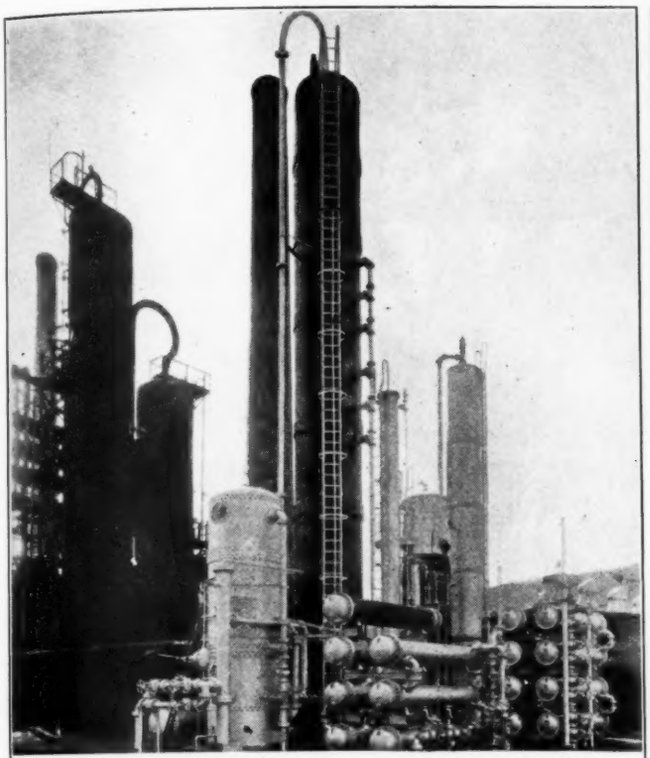
Tonka Water Hose made in sizes ¾ in. 2 ply to 1½ inch 3 ply inclusive. Tonka has a strong body and a cover stock that resists abrasion to the maximum, with strong live adhesion to keep the cover in place. This protects the hose from weather and abuse and insures long life.

THE
REPUBLIC RUBBER CO.
Youngstown
Ohio

●

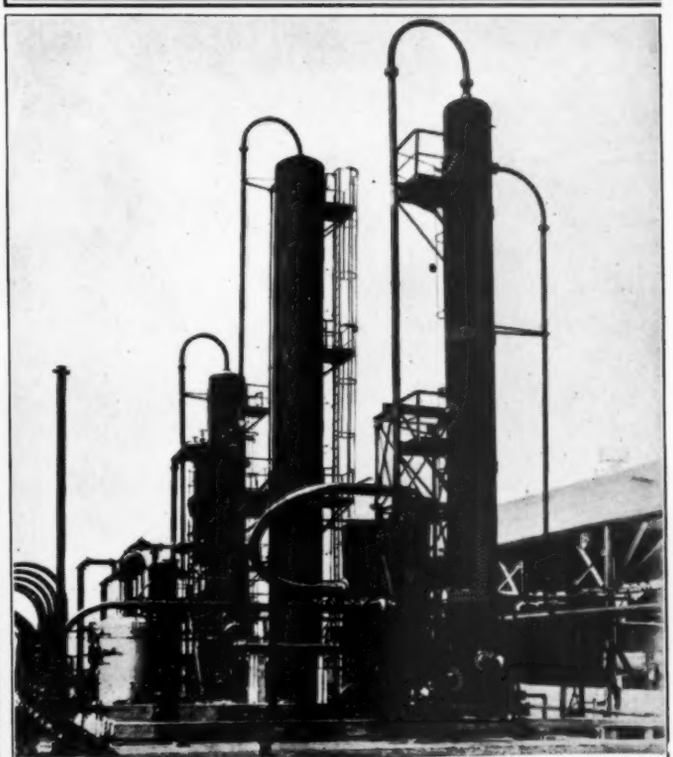
REPUBLIC means the Best Mechanical Rubber Goods

JACKSON
Vapor Recovery Plants



Vapor Recovery Plant and Cracked Gasoline Fractionating Unit, Pittsburg, Pennsylvania.

ENGINEERED THROUGHOUT TO MEET THE EXISTING CONDITIONS OF VAPOR QUALITY AND THE DESIRED ECONOMIC EXTRACTION



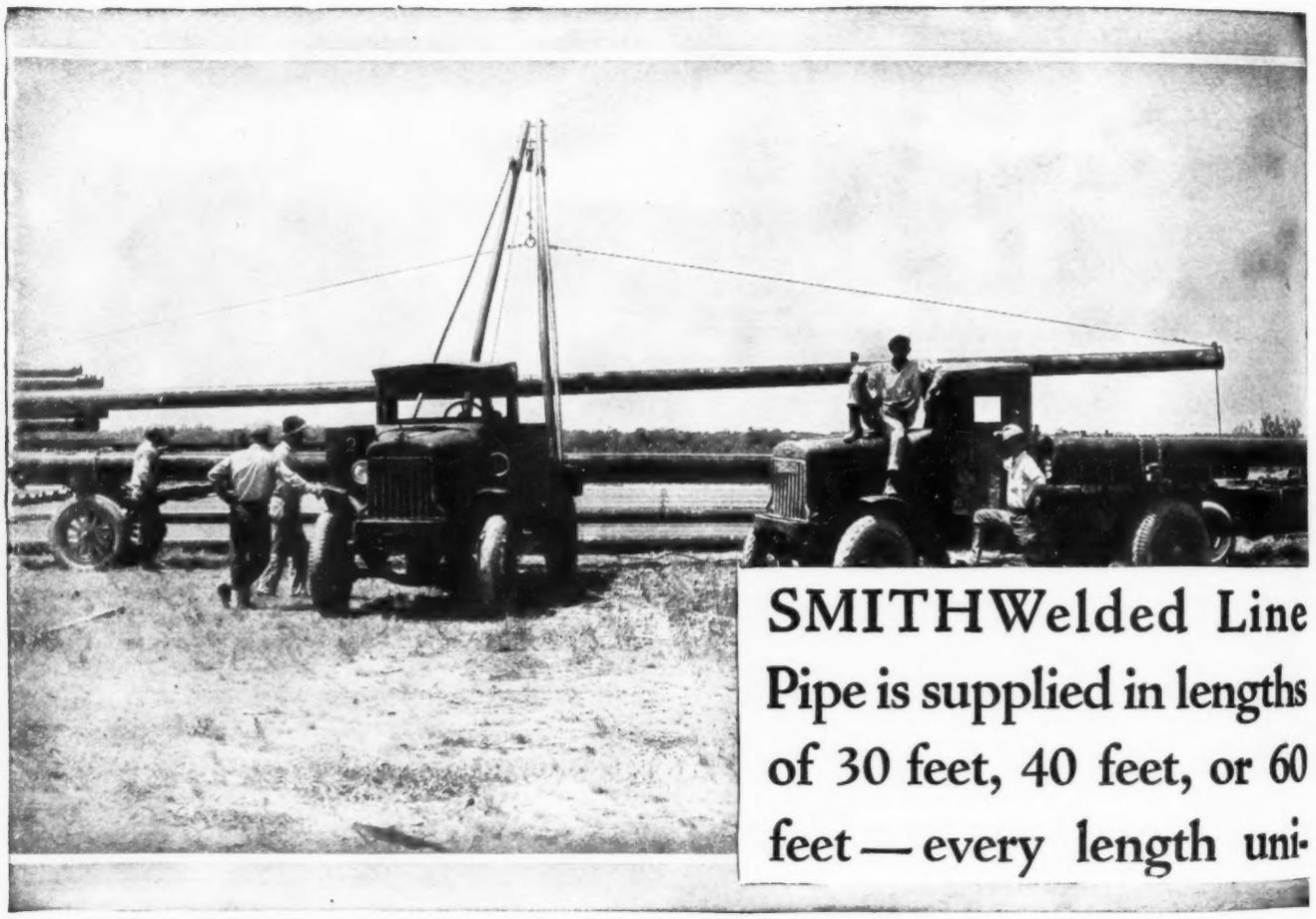
30,000 Gallon Per Day Vapor Recovery Plant and Fractionating Unit, Port Arthur, Texas.

JACKSON SERVICES:
Survey Based on Analyses
All Process Equipment
Complete Plant Layout
Specifications of Accessories
Field Construction
Instruction of Operators

NEW YORK HOUSTON DALLAS LOS ANGELES

When writing JACKSON ENGINEERING CORP. *please mention The Petroleum Engineer*

30·40·

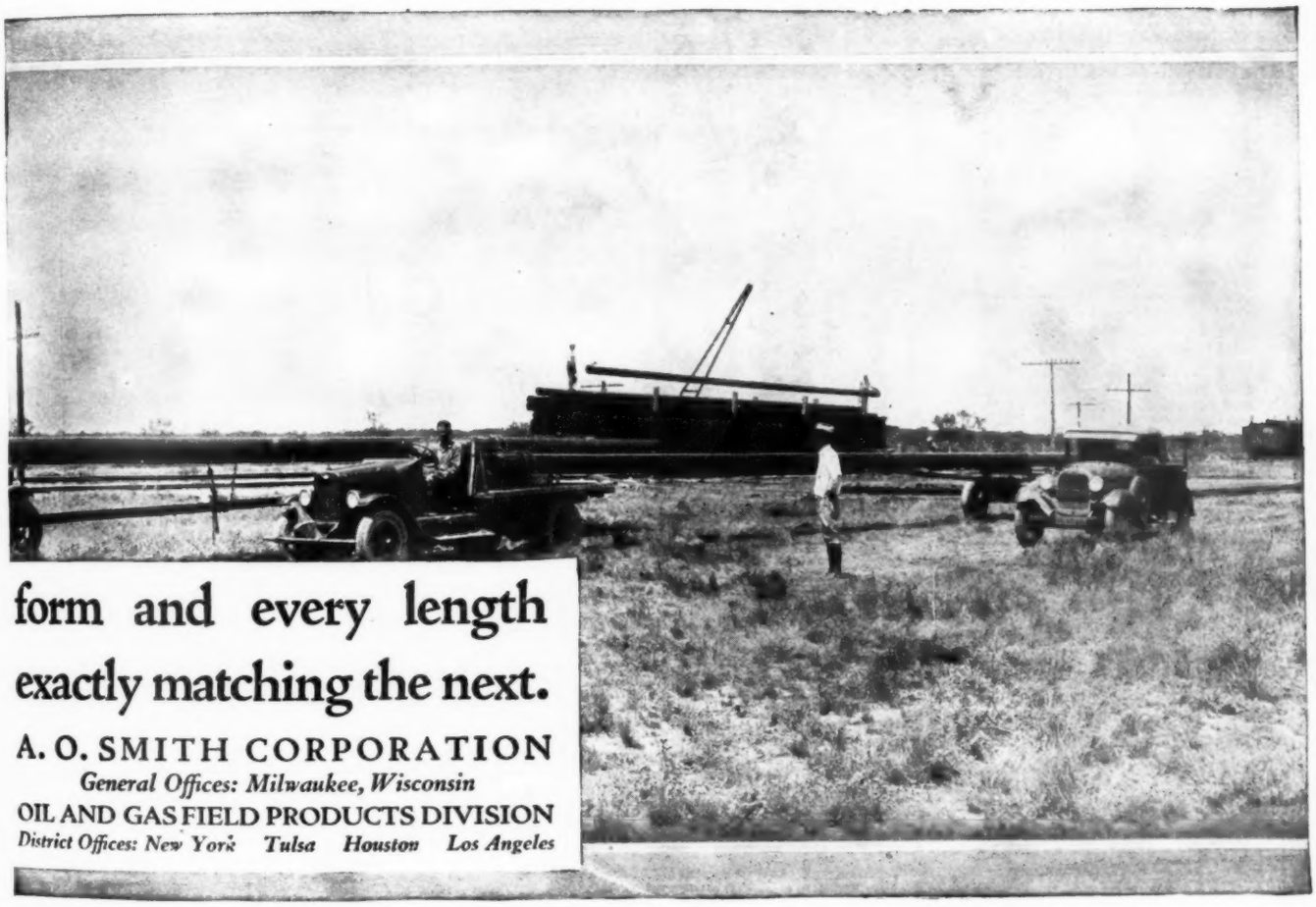


SMITHWelded Line Pipe is supplied in lengths of 30 feet, 40 feet, or 60 feet — every length uni-

SMITHWELDED

When writing A. O. Smith, Corp., *please mention The Petroleum Engineer*

60 FOOT LENGTHS



form and every length exactly matching the next.

A. O. SMITH CORPORATION
General Offices: Milwaukee, Wisconsin
OIL AND GAS FIELD PRODUCTS DIVISION
District Offices: New York Tulsa Houston Los Angeles

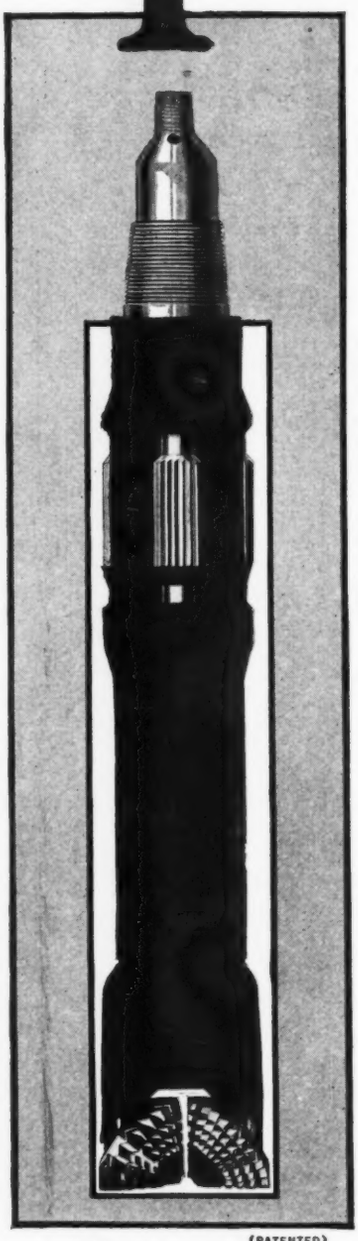
GAS LINE PIPE

When writing A. O. Smith Corp., *please mention The Petroleum Engineer*

With the NEW CP "Tucone" ROCK BIT

9 POINTS OF SUPERIORITY

1. **SAFETY**—Extra large drop-forged spindle bearings. No cone bushings. One-piece bit head. One-piece reamer body. FISHING ELIMINATED
2. **CIRCULATION**—Fluid stream jets directly on bottom of hole. No side-wall hydraulicking. STRAIGHT HOLE
3. **CLEARANCE**—Over 34% of hole area is clear. "Balling up" eliminated. STRAIGHT HOLE
4. **CONES AND SPINDLE BEARINGS**—Cones run on extra large replaceable drop-forged spindle bearings. Stronger and thicker cone wall section due to absence of bushing. GREATER STRENGTH
5. **REAMERS**—Three units, properly spaced and located for accurate reaming. New type reamer bearing eliminates wear on reamer body. KEEPS GAUGE — ALWAYS!
6. **ONE-PIECE BODIES**—Both bit and reamer bodies are solid manganese steel. GREATER STRENGTH
7. **REPLACEMENTS**—Cone-and-bearing units and reamers easily and quickly changed. TIME SAVED
8. **LOW MAINTENANCE**—Body repairs eliminated. No wear on bit head or reamer body. MONEY SAVED
9. **CONE SERVICE**—New CP "Red Head" cutting cones can be refitted on your used bearings (only at authorized CP Service Stations) and guaranteed by CP to be as good as if a new bearing were used—at a great saving to you! ECONOMY



(PATENTED)

THREE REAMER CUTTERS

Properly spaced and located for accurate reaming. New type reamer bearing eliminates wear on body.

KEEPS GAUGE—ALWAYS!

Three separate reamer cutters are placed at the proper distance for best alignment and efficient reaming. The reamer cutters rotate on a bearing held in the reamer body by a bearing pin. Thus, any wear caused by the reaming action falls on the reamer cutters and the bearings—there is no wear on the reamer body itself, therefore, NO LOSS OF GAUGE!

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: Chicago Pneumatic Bldg., 6 East 44th St., New York

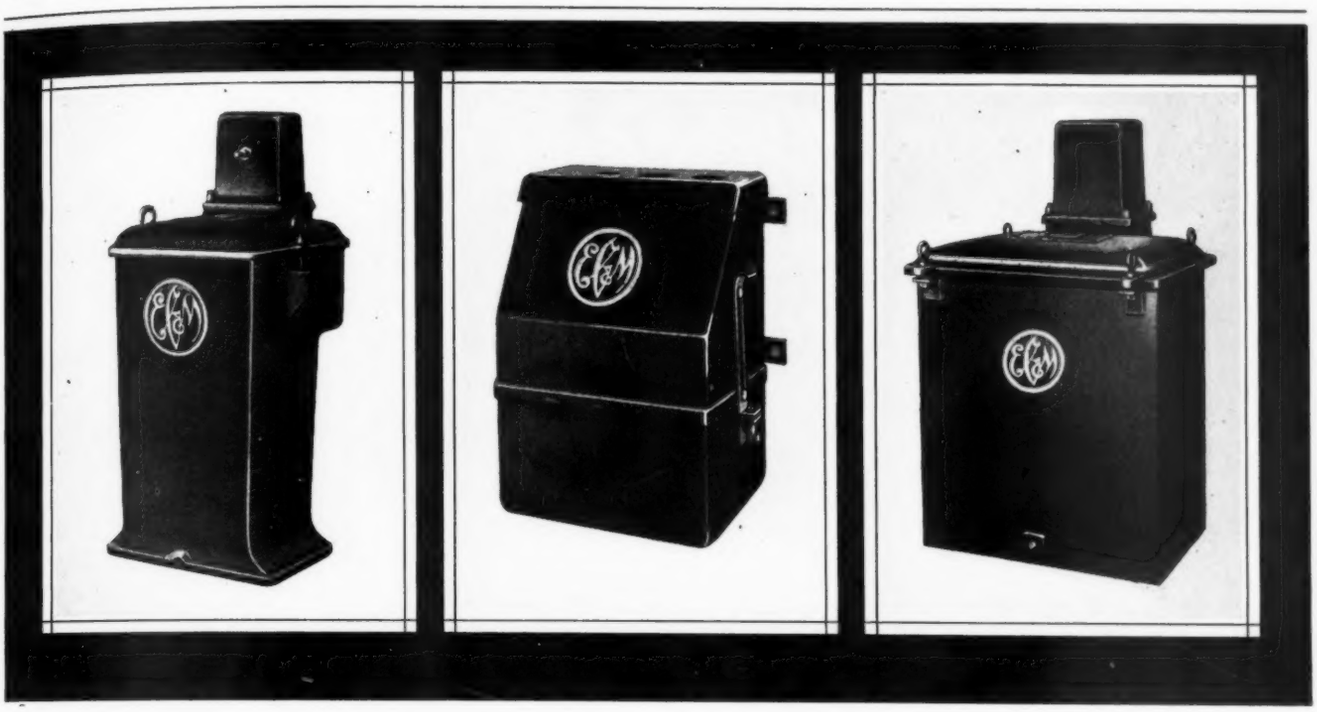
OIL TOOL DIVISION OFFICES:

OKLAHOMA CITY, OKLA. — 655 Santa Fe Ave., LOS ANGELES, CAL.

KEEPS GAUGE ... ALWAYS! OT-15

That the use of CP "Tucone" Rock Bits will unquestionably result in lower drilling costs, we are ready and willing to prove in any way YOU say! An inquiry to any of the above addresses will receive immediate attention.

Your Opportunity to Examine *these Flameproof Motor Starters*



At the International Petroleum Exposition

LET us show you how these motor starters provide 100 per cent safe operation in any highly explosive atmosphere. See for yourself how they provide complete protection against a disastrous fire.

Every main contact of these starters opens and closes under oil and overload contacts operate either under oil or in a sealed vacuum.

Equally important is the sensitive and accurate overload device, self-contained in each starter. Each is designed to operate with instrument-precision, thereby safeguarding the motor against any abnormal condition which would cause the motor to overheat and possibly start a fire.

Illustrated above (from left to right), these oil-immersed flameproof motor starters are: The Low Voltage Automatic Compensator, The Type ZO Across-the-line Starter and The High Voltage Automatic Compensator. If you do not have our Bulletins 1042-G, 1047-A and 1048-P describing these flameproof starters, ask our nearest branch office for your copies.

Visit Our Booth, Space No. 55, California Bldg.
October 4-11

THE ELECTRIC CONTROLLER & MFG. CO.

NEW YORK-50 CHURCH ST.
CHICAGO-CONWAY BLDG.
DETROIT-DIME BANK BLDG.
BIRMINGHAM-BROWN-MARX BLDG.
CINCINNATI-1ST NATIONAL BANK BLDG.
ST. LOUIS-4227-A CASTLEMAN AVE.

CLEVELAND, OHIO

LOS ANGELES-912 E. THIRD ST.
HOUSTON-P.O. BOX 4182
TORONTO-REFORD BLDG.

PHILADELPHIA-WITHERSPOON BLDG.
PITTSBURGH-OLIVER BLDG.
SAN FRANCISCO-CALL BUILDING
MONTREAL-CASTLE BLDG.
TULSA-217 E. ARCHER ST.
SEATTLE-ALASKA BLDG.

When writing THE ELECTRIC CONTROLLER & MFG. CO. *please mention The Petroleum Engineer*

"MUD <<<< HANDLED AT THE PROPER WEIGHT AND IN THE PROPER MANNER"

Oklahoma City, Okla. May 28th 1930.

Hall & Briscoe Inc.
Commerce Exchange Bldg.
City.

Gentlemen:

We, the property owners of East Capitol Hill wish to express our appreciation to Hall & Briscoe for the safe methods employed in the bringing in of the tremendous Holmes gusher.

It is our opinion that your demonstration of how the largest wells can be brought in under perfect control, and without damage to adjacent property, has had much to do with the City Council's decision to extend the U-7 zone to include our property.

While the bringing in of this enormous producer lacked the usual spectacular performance, that of spraying the surrounding country (and City) with oil, the job was certainly well done, and the neatest job in the field.

While we might not qualify as experts, may we offer the suggestion that if other Companies gave their wells as close personal supervision, used the same weight mud, and adopted other safety methods used by Hall & Briscoe the largest wells in the field could be brought in with comparative safety, even in the thickly populated sections of the City.

Yours respectfully,

H. P. STRICKLAND,
Chairman of meeting.

DRILLING RULE IS PROPOSED

F. C. Hall Writes Letter to City Officials on Need for Inspectors

Recommendations of F. C. Hall, of Hall-Briscoe, Inc., on city field drilling were made in letters to City Manager Fry, Mayor Dean, Ed Overholser and Bliss Kelly. The letter follows:

"I assure you, without solicitation but with the hope that what I might say would be of benefit with reference to the present drilling campaign in the city field, and which will be doubled and possibly trebled by reason of our well on the Holmes farm just having been brought in, making between 20,000 and 25,000 barrels, I thought that a few suggestions as to the method of handling these wells would be acceptable.

"In the first place, wells drilled to this tremendous depth must be handled with heavy mud. It has been suggested by other operators that it would be impossible to drill wells in the Oklahoma City field with 11½ pounds of mud to the gallon. Please be advised that our company uses only 11½ pounds and above mud after we leave the bottom of the nine inch pipe which is approximately 5500 feet. On our Holmes well the mud weighed probably 12 and 15 pounds. We brought this well in even after dark with lights on, we think very successfully, and so can all the wells now being drilled in the city field and in the platted districts, provided this mud is handled at the proper weight and in the proper manner."

MAKE LUCEY PUMPS A VITAL SAFETY FACTOR IN THE DRILLING ... OF HIGH PRESSURE WELLS

LUCEY PRODUCTS CORPORATION

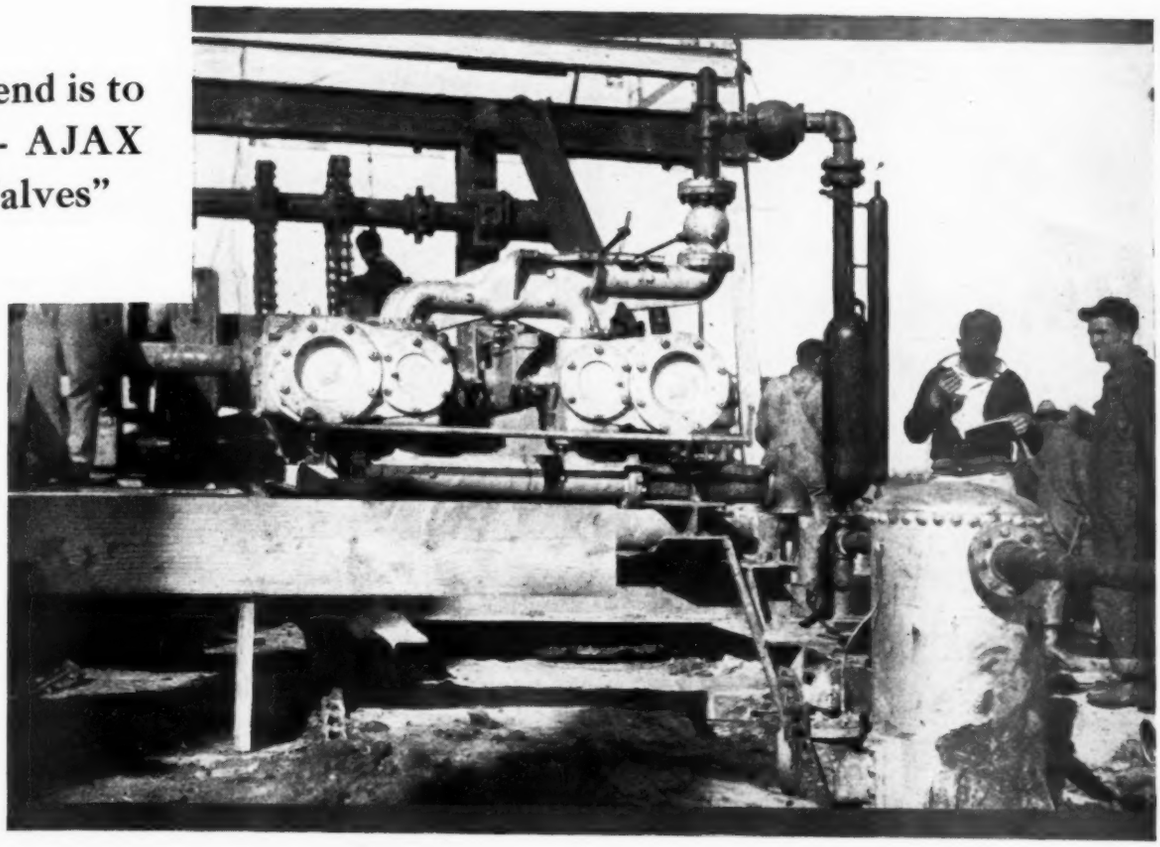
DOMESTIC HEADQUARTERS
224 EAST BRADY STREET TULSA OKLAHOMA

BRANCHES
OKLAHOMA CITY OK · DUNCAN OKLA · MAUD OKLA · SHREVEPORT LA · HOUSTON, TEXAS · LOS ANGELES, CALIF

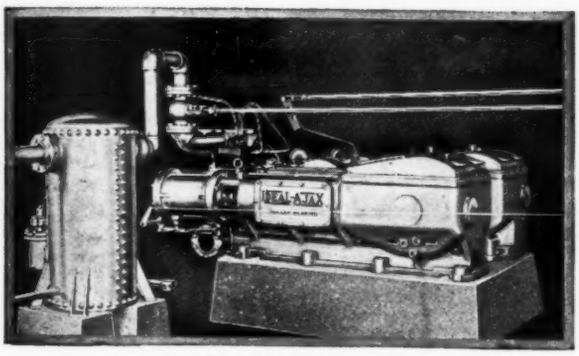
EXPORT
3505 WOOLWORTH BUILDING NEW YORK CITY
54 OLD BROAD STREET LONDON E C 2 ENGLAND
55 RUE DE RIVOLI (1 ER) PARIS FRANCE
PLOESTI, ROUMANIA
SAN FERNANDO, TRINIDAD, B. W. I.
DIAGONAL ROQUE SAENZ PEÑA NO. 501 BUENOS AIRES, ARGENTINA, S. A.

When writing LUCEY PRODUCTS CORP. *please mention The Petroleum Engineer*

"The Trend is to IDEAL - AJAX Piston Valves"



New IDEAL-AJAX 12x12 Twin Roller Bearing Engine with extra heavy Steam Separator.



Latest Model IDEAL-AJAX Twin Roller Bearing Engine with Large Capacity Steam Separator.

After Drilling Six Wells Without Any Repairs

EVER increasing use of IDEAL-AJAX Piston Valve Engines by experienced men who know how to judge, is grateful tribute to the hours of effort on a background of experience, to keep a little ahead of requirements.

Give them a chance to show their pedigree! Ask the National Supply Company man for details.

IDEAL-AJAX

ROLLER BEARING STEAM DRILLING ENGINES

Made by

AJAX IRON WORKS,

Corry, Pa.

When writing AJAX IRON WORKS *please mention The Petroleum Engineer*

A.P.I.
PUMP STANDARDS
ARE...

embodied in every part of Axelson pumps. Few changes have been necessary in any of the Axelson liner pumps to convert them to 100% A.P.I. Every part of the pump from top collar to standing valve shoe may be furnished to A.P.I. specification if the operator so desires. Axelson manufactures all necessary gages to meet A.P.I. tolerances with the same degree of accuracy which has characterized our workmanship for the past four decades. A.P.I. pump standards are truly Axelson pump standards to the most minute detail.

..AXELSON
PUMP STANDARDS

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO., LTD.

General Offices and Factory, Corner Boyle Ave. and Randolph St.
Los Angeles, California (P.O. Box 337)

Tulsa St. Louis New York City, 30 Church Street

MID-CONTINENT AND EASTERN DISTRIBUTORS — FRICK-REID SUPPLY CORPORATION

When writing AXELSON MANUFACTURING CO., LTD., *please mention The Petroleum Engineer*

Remember .....

QUALITY PRODUCTS ONLY
are found at Frick-Reid Stores

It is the privilege of any business to cater to any class of patronage desired, or to several classes. The huge department store may be a very Ritzy establishment on the main floor, with a bargain basement where a second-class of merchandise is frankly sold. Frick-Reid chooses to sell Quality Products Only, firmly believing that there is no such thing as a bargain in oil country merchandise. Either a thing is dependable or it isn't, and there can be no economy in a thing that isn't. Field men know this. They understand and appreciate the fact that if Frick-Reid sells it, it must be right,—that it will never add unnecessarily to the burden of their work or the hazard of their business. Frick-Reid is proud of its friends in the field, and proud of the way that friendship is acquired and held.

FRIENDLY STORES EVERYWHERE FROM THE ATLANTIC COAST TO THE ROCKIES

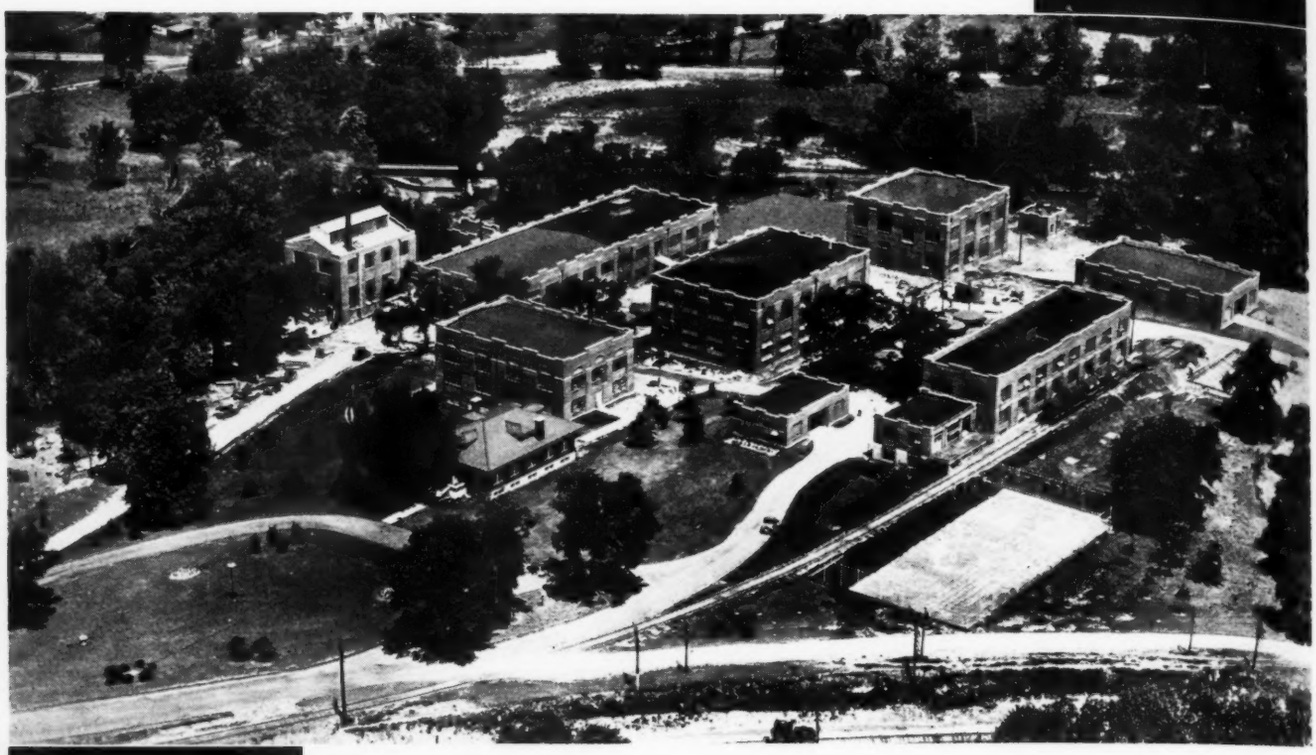
FRICK-REID
SUPPLY CORPORATION

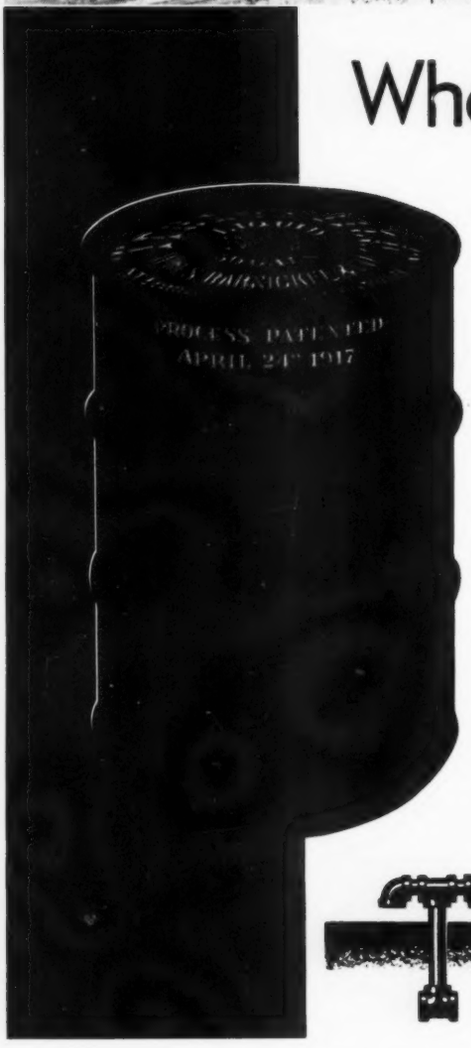
PITTSBURGH, PENNSYLVANIA

TULSA, OKLAHOMA

When writing FRICK-REID SUPPLY CORP. *please mention The Petroleum Engineer*

"The College of 'Cut Oil'"





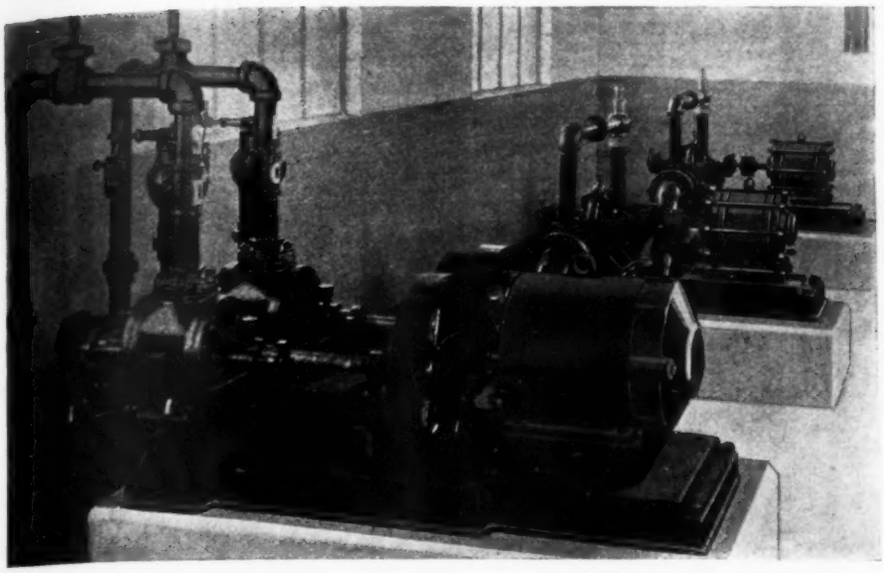
Where "Cut Oil" Problems are Scientifically Solved

Years of research into the cause and cure of petroleum emulsions by the late Wm. S. Barnickel preceded the development of the Tret-O-litE Process—the first commercially successful method for recovering oil from "cut oil" and "B. S." This intensive study has never ceased. At the present home of Tret-O-litE (shown above) a laboratory occupying an entire building, a large staff of expert chemists, and the accumulated experience of the Wm. S. Barnickel & Company organization are devoted to solving with scientific thoroughness the "cut oil" problems of the industry. . . . Representatives in every district place the knowledge and resources of this company at the disposal of oil producers.

WM. S. BARNICKEL & COMPANY
Webster Groves, St. Louis County, Mo.

Tret-O-litE
Reg. U. S. Pat. Off.

When writing Wm. S. Barnickel & Co. *please mention The Petroleum Engineer*



VIEW showing part of new loading-rack pump-house, at a large Oklahoma refinery, where 5 L.A. "explosion-proof" motors are direct-connected to pumps of well-known make. The *small size* of L.A. "explosion-proof" motors—which generally fit into same space as "open motors"—*permitted the use of stock pumps with standard bases.*

Louis Allis
"Explosion-Proof" Motor.
Approved by Underwriters' Laboratories for operation wherever petroleum products are made, used or handled.

"EXPLOSION-PROOF" MOTORS ...*Eliminate Fire Walls!*

Booth No. 44 California Building

HERE is a *1930* loading-rack pump-house, where large interstate tank trucks and trailers are loaded, at one of Oklahoma's largest refineries.

The pumps (including two not shown in the picture) handle *stove distillate, fuel oil, kerosene,* and *3 grades of gasoline.* Consequently, *explosive vapors* may prevail throughout the pump-house.

Yet there is no need here for the conventional fire wall between pumps and motors. Fire walls, although included in the original plans, were *eliminated* when the Refinery Engineer specified Louis Allis "Explosion-Proof" or type E motors for *all* pumps in this building.

And this decision *not only* avoided expensive, inflexible, and antiquated construction. It also eliminated the *dangers of fire walls* due to possibility of defective stuffing boxes, openings left around shaft, and doors in fire walls being left open.

With type E motors, you are not *guessing* at safety. Your *assurance* is the fact that these motors are tested and definitely approved by Underwriters for use in *explosive atmospheres* of petroleum vapors. Then why install fire walls—or, worse still, non-approved motors? *Standardize* on Louis Allis "explosion-proof" motors wherever explosive atmospheres may prevail!

WRITE FOR COMPLETE INFORMATION.

WARNING to REFINERS!

Do not confuse the Louis Allis "EXPLOSION-PROOF motor with so-called "vapor-proof" motors. Real "EXPLOSION-PROOF" motors must be specially constructed and must pass severe explosion tests to be approved by Underwriters' Laboratories for use in explosive atmospheres.

LOUIS ALLIS

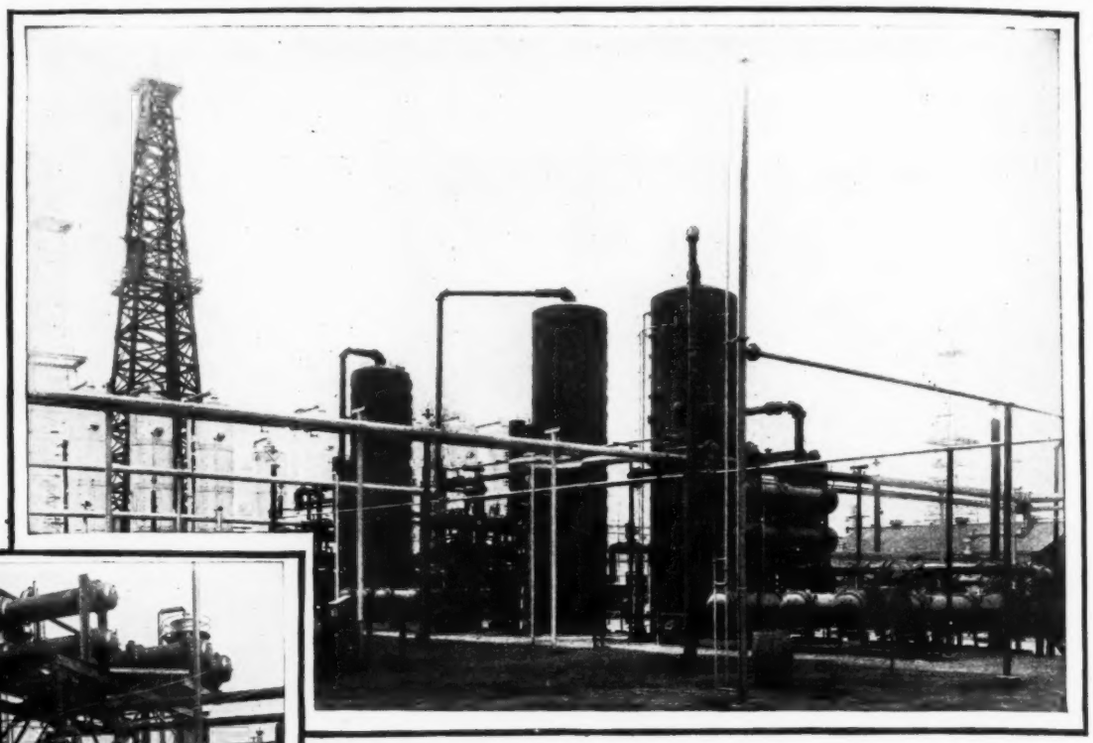
"EXPLOSION-PROOF" *Electric* MOTORS

THE LOUIS ALLIS COMPANY
MILWAUKEE, WIS.

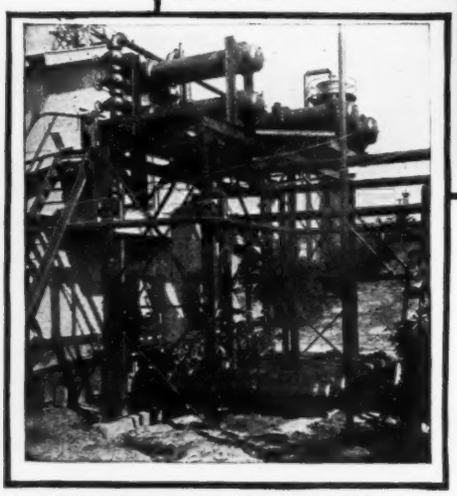
Motor Specialists for 29 Years — *Offices in Principal Cities*

Sales Offices: Tulsa, Houston, St. Louis, Chicago, Detroit, Cleveland, Pittsburgh, New York, Philadelphia, Boston, Buffalo, Los Angeles, San Francisco . . . . and other principal cities.

BRAUN ABSORPTION PLANTS



Here is part of the BRAUN apparatus in a Western absorption plant, the World's largest producer of natural gasoline. The BRAUN Organization continues to lead in the design and manufacture of Natural Gasoline plants. It points with pride to the almost countless installations in continuous operation throughout the world.



An early BRAUN absorption plant photographed when the Natural Gasoline industry was emerging from its perambulator days. Crude, no doubt, to the modern eye but in its day a new departure . . . composed of scientifically designed, compact, efficient apparatus.

Yesterday... and TODAY

Users of BRAUN apparatus appreciate that the quality of their equipment insures freedom from shutdown. They know that extra strength, dependability, efficiency and ease of maintenance are built-in features of BRAUN apparatus . . . and at lower first cost.

C·F·BRAUN & CO., LTD.

Manufacturers and Constructors

ALHAMBRA CALIFORNIA

NEW YORK
120 Broadway

TULSA
Exchange National Bank Bldg.

HOUSTON
Neils Esperson Bldg.

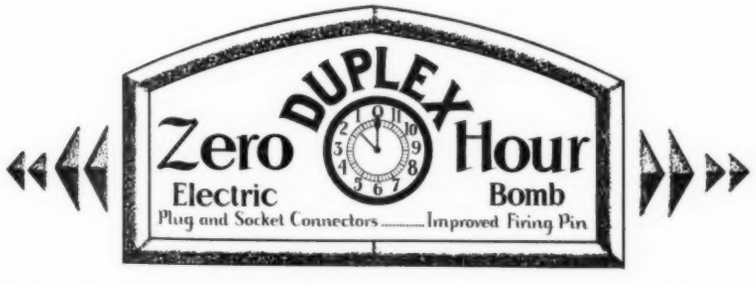
When writing C. F. BRAUN & Co. *please mention The Petroleum Engineer*

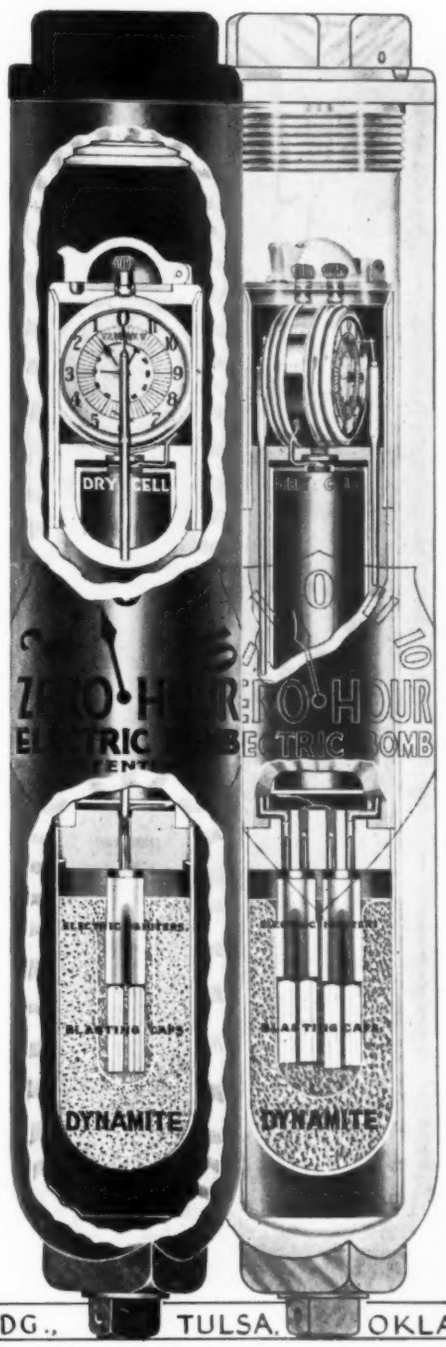
Prospective Shooting Results became Practical Results with the advent of the TIME BOMB..

Shooting an oil well back in the days of the "go-devil", Bumper, Jack and Electric Wire Squibs, was as uncertain a procedure as the attempt to find the oil in the first place. The operator who brought in a nice well was confronted with the possibility of ruining it if he tried to shoot it — with the methods he had to employ. Shooting, however, was a proven means of increasing production, so the oil world was particularly primed when the day arrived which brought the time bomb, an electrically operated, time-controlled detonating device, positive in action and capable of being set to explode at any time desired up to twenty-two hours later. Conscious of the desire for positive and dependable action, the makers of the time bomb studied means to increase these factors and today we have the Zero Hour Duplex Electric Bomb, the most perfect detonating device ever developed.

The Zero Hour Duplex Electric Bomb has two complete timing and firing mechanisms in the same metal, fluid-tight container that formerly held one only. Two specially constructed watches allow as many as twenty-two hours of work to be done, after the bomb is set and placed over the charge of nitro-glycerin, before the "zero hour" is reached and the shot put off. This allows a wide range of activity and has directly sponsored improved methods such as the "cement tamped" shot. The Zero Hour Duplex Electric Bomb, with its double mechanism, makes shot failures and shooting accidents as obsolete as the old methods which used to cause them.

Zero Hour Bombs are Obtainable Through All Principal Torpedo Companies.





ZERO HOUR TORPEDO COMPANY, 408 COSDEN BLDG., TULSA, OKLA.

When writing Zero Hour Torpedo Co. *please mention The Petroleum Engineer*

WHY WORRY ?

You can forget your pipe worries and speed up your jobs—if your pipe and casing come to you equipped with Colona Protectors.

These big, husky, heavy gauge protectors cover the ends as well as the threads—bumps and bangs—grease and sand—cannot injure the pipe—it reaches you in the same identical condition it left the mill.

All you have to do—is to specify "Colona Protectors." Why not do it?

Pittsburgh Screw & Bolt Corporation
Colona Division « » Pittsburgh, Penna.

Demand COLONA
PIPE THREAD PROTECTORS

When writing Colona Division Pittsburgh Screw & Bolt Corp. *please mention The Petroleum Engineer*

Oklahoma City Pool. AQUAGEL is available at all major fields in the Mid-Continent.

. . . . now Used in HUNDREDS of Drilling Wells

To overcome drilling difficulties and insure the safety of their drilling investments, hundreds of operators are using AQUAGEL . . . the colloidal compound for Rotary Mud. Added to any drilling mud in very small quantities . . . AQUAGEL converts the mud into the best transporting and sealing medium known. Any non-abrasive earth plus AQUAGEL . . . makes efficient drilling mud.

AQUAGEL prevents loss of fluid from the hole . . . Its plasticizing action stops sloughing and caving. Stuck drill pipe is practically unknown when AQUAGEL-treated mud is used . . . Replacement of slush pump parts is reduced to a minimum . . . due to AQUAGEL'S lubricating features. This saving alone will buy all the AQUAGEL required to drill a well.

AQUAGEL helps remove cuttings from the bottom of the hole as fast as they are disengaged from the formation . . . this feature assists in drilling straight hole. AQUAGEL minimizes gas cutting . . . restores lost circulation . . . prevents mudding off producing sands. It flushes readily from the producing sand when well is brought in and reduces abrasion.

Manufactured and marketed under patents and pending patents of the Silica Products Company of Kansas City, Missouri, from our Los Angeles and Osage, Wyoming, plants.

See our Exhibit at the International Petroleum Exposition, Tulsa.

Have you asked for YOUR copy of new AQUAGEL booklet? Illustrates and describes the ideal colloidal compound for Rotary Mud. Send for it Today!

AQUAGEL

CALIFORNIA TALC COMPANY

837 JACKSON STREET . . . LOS ANGELES, CALIF.

CALIFORNIA DISTRIBUTORS

Bakersfield	Carl Ingalls
Brea	Rotary Materials Co.
Coalinga	Oil Well Supply Co.
Goleta	Oil Well Supply Co.
Long Beach	Crail Bros.
Long Beach	Speed & Service Trucking Co.
Santa Barbara	Oil Well Supply Co.
Santa Fe Springs	Crail Bros.
Santa Fe Springs	Speed & Service Trucking Co.
Taft	Oil Well Supply Co.
Ventura	Oil Well Supply Co.

MID-CONTINENT DISTRIBUTORS

LUCEY PRODUCTS CORP.
224 East Brady Street, Tulsa, Okla.

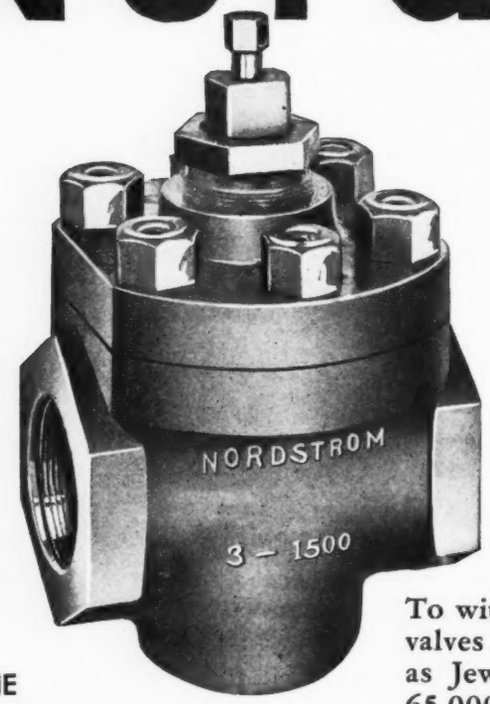
BRANCHES
Houston and Pettis, Texas
Shreveport, La.

BRIDGEPORT MACHINE COMPANY
General Offices and Plant: WICHITA, KANSAS

BRANCHES

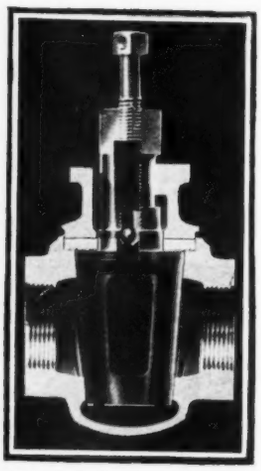
KANSAS	TEXAS	OKLAHOMA	NEW MEXICO
El Dorado	Breckenridge	Oklahoma City	New Hobbs
Hugoton	Pampa	Seminole	
McPherson	Odessa	Maud	OHIO
Russell	Ranger	Tulsa	Marietta
		Marshall	

Nordstrom 1500 pound Valve *Lubricated*



To withstand severe working pressures, Nordstrom 1500 lb. valves are manufactured of a high grade malleable iron known as Jewell Steel with a tensile strength of from 55,000 to 65,000 pounds per square inch and a yield point of from 40,000 to 45,000 pounds per square inch. All are lubricated by the patented "Sealdport" method.

THE PERFECT APPLICATION OF A PRINCIPLE



Nordstrom "Sealdport" Lubrication provides lubricant ducts so arranged as to furnish an unbroken ring of lubricant around both inlet and outlet ports of the valve which assures a complete lubricant seal as well as securing adequate distribution of lubricant over the machined surfaces. The valves are always easy to turn because the lubricant frees the plug by hydraulic pressure.

"Merco" Lubricants in stick form are manufactured for use in all Nordstrom Valves. There are special lubricants for each valve service in the Petroleum Industry — and the "Merco" Lubricant best suited to your requirements will be gladly recommended.

"Merco" Pipe Compound is a metallic lead product for sealing screw thread or gasket joints. Will not corrode or freeze the joint. Readily applied with a brush.

Ask for Latest Catalog

MERCO NORDSTROM VALVE COMPANY
SUBSIDIARY OF THE MERRILL COMPANY . . ENGINEERS

Atlanta - Healy Bldg.
Boston - 184 Boylston St.
Buffalo - Genesee Bldg.
Chicago - 176 W. Adams St.
Dallas - Magnolia Bldg.
Detroit - 2842 West Grand Blvd.
El Paso - 111 So. Virginia St.
Houston - Petroleum Bldg.
Los Angeles - 566 So. San Pedro St.
New Orleans - Masonic Temple Bldg.
New York - 11 W. 42nd St.
Pittsburgh - Clark Bldg.
St. Louis - 317 N. Eleventh St.
San Francisco - 343 Sansome St.

Agencies:

Denver - Republic Supply Company, 832 Continental Oil Bldg.
Honolulu - W. A. Ramsay Co., Ltd., Fort & Queen Streets
Manila - E. W. Sharp, c-o J. A. Murphy Co., Perez Semanillo Bldg.
Philadelphia - Brown, Wilson & Company, 1600 Arch St.
Saginaw - Arthur C. Beckert, 112 Durand Street
Salt Lake City - National Equipment Co., 101 West 2nd South St.
Tulsa - B.V. Emery & Company, 216 E. Brady Street

Factories in U. S. Oakland, Calif. and Belleville, N. J.
Canada - Peacock Bros., Ltd., Montreal, Toronto, Winnipeg, Vancouver. (Also Sydney, N.S.)
England - Audley Engineering Co., Ltd., Newport, Shropshire.
Buenos Aires, Argentine, - General Electric, Soc. Anon., Victoria 618 Esq. Peru.

SEALED AGAINST LEAKS

When writing MERCO NORDSTROM VALVE CO. *please mention The Petroleum Engineer*

For STRENGTH and UNIFORMITY Use

Look for the triangle on the reel

WICKWIRE SPENCER STEEL CO.
Home Office: 41 East 42nd St., New York City
Branches: San Francisco, Los Angeles

WICKWIRE SPENCER STEEL CO.

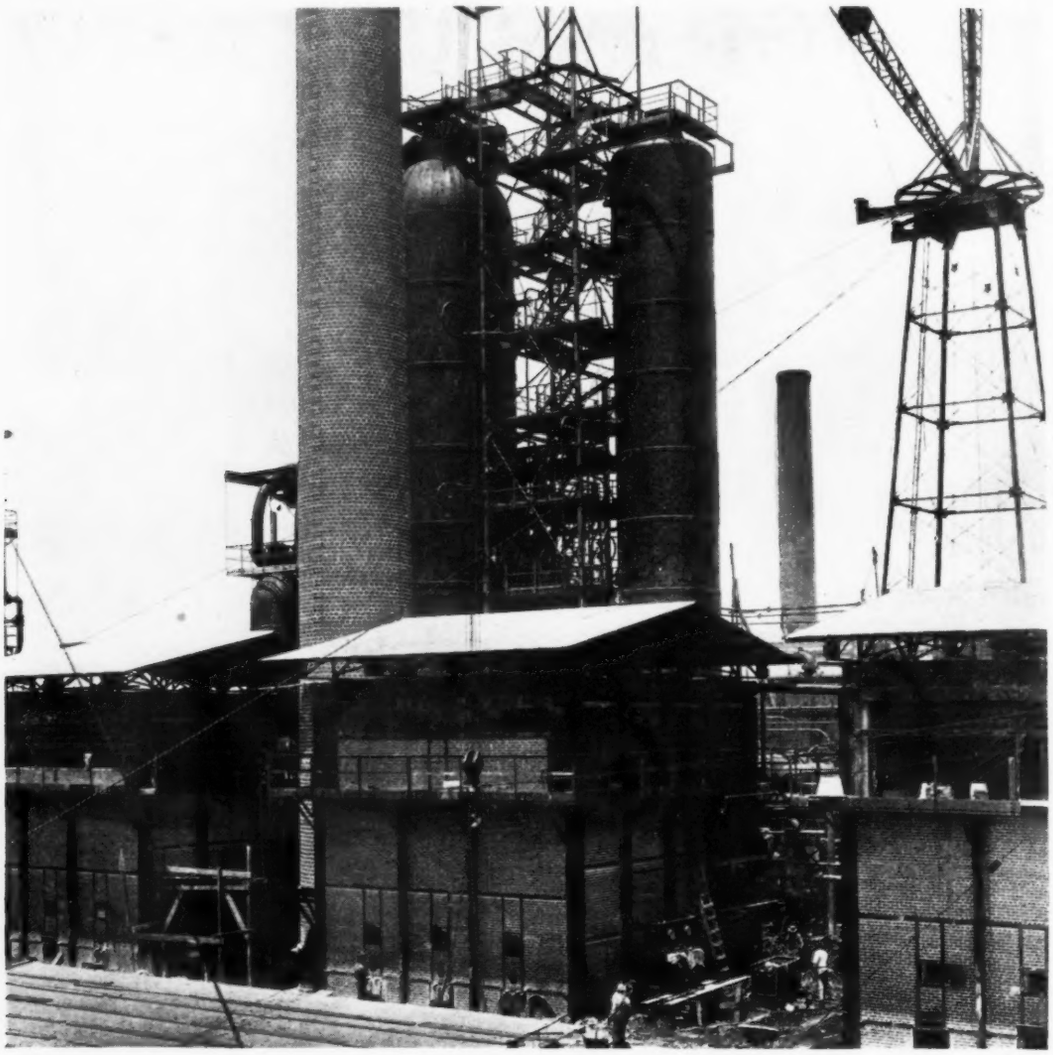
WICKWIRE SPENCER
WIRE ROPE

Also Distributed by

WICKWIRE SPENCER SALES CORPORATION
Tulsa, Okla.
Seattle, Wash. Portland, Ore.

Iverson Tool Co. Tulsa, Okla.
T. T. Word Supply Co. Houston, Texas
Acme Tool Co. Breckenridge, Texas
Lucey Products Corp. Tulsa, Okla.
A. F. Keck & Co. Butler, Pa.
Standard Supply & Hdwe. Co. New Orleans, La.

When writing WICKWIRE SPENCER STEEL CO. *please mention The Petroleum Engineer*



Modern Refining

The above illustration shows a two-stage Foster Wheeler distilling unit designed to process 14,000 barrels per day of Mid-Continent Crude. The lighter fractions are removed at atmospheric pressure and the heavier fractions under high vacuum. The necessity of obtaining low absolute pressure at the point of flash when using high temperature cooling water presented an interesting problem in the design of the vacuum stage.

Foster Wheeler refinery design is based on experience gained through the installation of distilling units in refineries throughout the world. A wide fund of practical knowledge is available to those contemplating refinery expansion or confronted with unusual distillation problems.

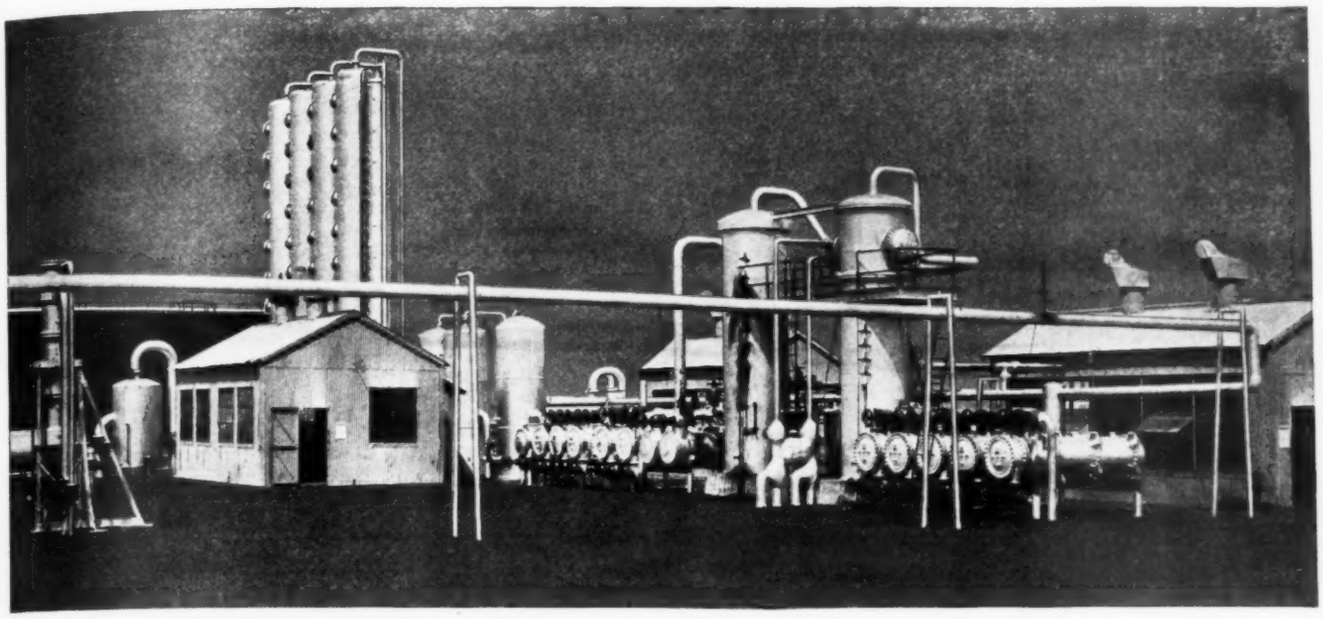
FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.
Branches in Principal Oil Centers

Foreign Associates: Foster Wheeler Limited, London, England
Societe Anonyme Foster Wheeler, Paris, France
Foster Wheeler Limited, Toronto—Montreal, Canada

FOSTER WHEELER

When writing FOSTER WHEELER CORPORATION, *please mention The Petroleum Engineer*

An Entire Installation made with TUBE-TURNS *exclusively*



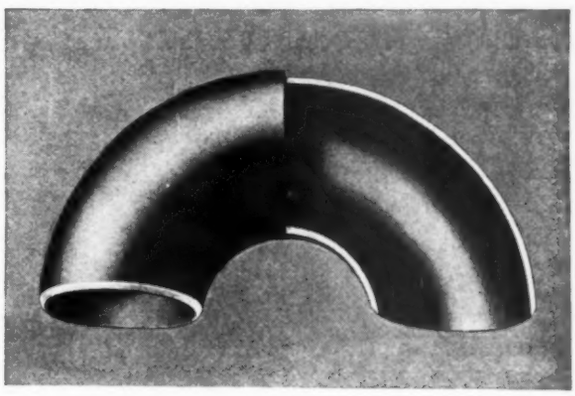
THIS photograph shows a modern natural-gasoline plant in which EVERY fitting is a Tube-Turn.

Study the smooth, short-radius turns—the easy, free-flowing curves possible only with Tube-Turns. Then remember the things that don't photograph—that Tube-Turns are lighter, stronger, easier to install, easier to insulate, cause less pressure-drop and form tighter, *permanent* jobs.

Two years ago Tube-Turns were practically unknown. Today they are in constant use by almost EVERY important process industry.

If you have never heard the complete Tube-Turn story, we earnestly urge you to write for Bulletin No. 104. You will be amazed at the overwhelming superiority of Tube-Turns and welding for all your process piping. No obligation, of course. *Address:* TUBE-TURNS, *Incorporated,* 1307 S. Shelby St., Louisville, Ky.

Tube-Turns are short-radius fittings for pipe welding. Absolutely uniform walls—no thickening, no thinning, no buckling. Full, round cross-section. Greater strength. Less pressure-drop. NO LEAKS. Get all the facts TODAY.



TUBE-TURNS

The Stock Fittings for Pipe Welding

DISTRIBUTORS IN:

Atlanta	Charlotte	Fall River	Houston	Minneapolis	Richmond
Baltimore	Chicago	Fort Wayne	Indianapolis	New York	St. Louis
Birmingham	Cincinnati	Fort Worth	Kansas City	Philadelphia	St. Mary's
Buffalo	Cleveland	Grand Rapids	Los Angeles	Pittsburgh	San Francisco
Cambridge	Dayton	Hartford	Maracaibo	Portland	Seattle
Charleston	Detroit	Honolulu	Milwaukee	Providence	Tacoma
					Toledo

This is the kind of Core you want!

Bit for the Elliott Cable Tool Core Drill

The above illustration, from an unretouched photograph, shows a section of core taken with an Elliott Core Drill.

Elliott Cores prove Elliott supremacy in every coring operation. They are long, clean, informative specimens of the various formations encountered, and their cost — per foot of recovery — is decidedly low. For consistent performance and proven economy always specify Elliott Core Drills.

Elliott
CORE DRILLING COMPANY
4731 East 52nd Drive
LOS ANGELES, CALIFORNIA.

Export Office:
150 Broadway, New York

Distributed exclusively in the United States East of the Rocky Mountains, by
HINDERLITER TOOL COMPANY of Tulsa, Okla.

ELLIOTT
Core Drills

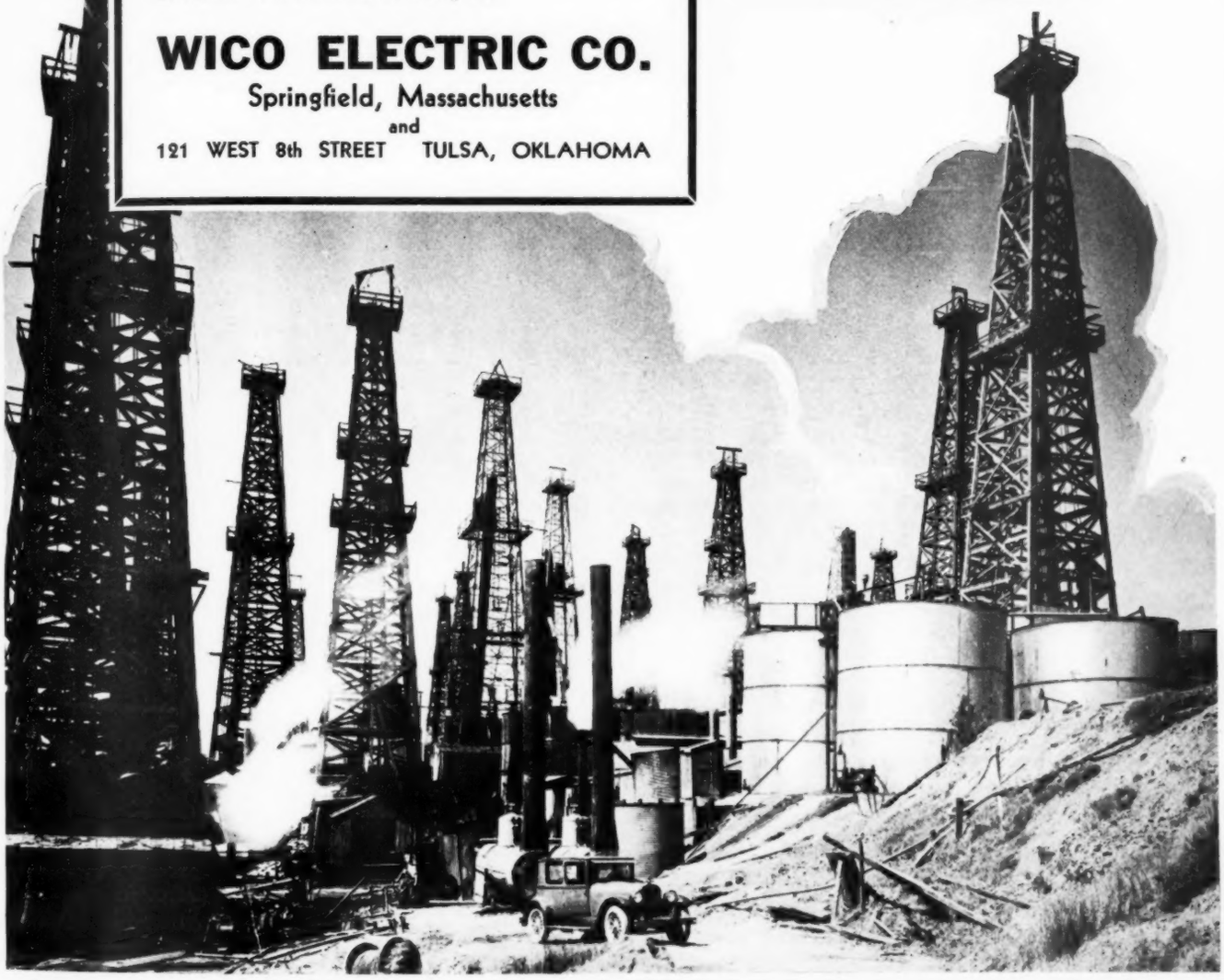
When writing ELLIOTT CORE DRILLING CO. *please mention The Petroleum Engineer*

DERRICKS *mean* WICOS

Wherever there is oil, there are WICO Magnetos. WICOS provide the most reliable form of engine ignition ever developed.

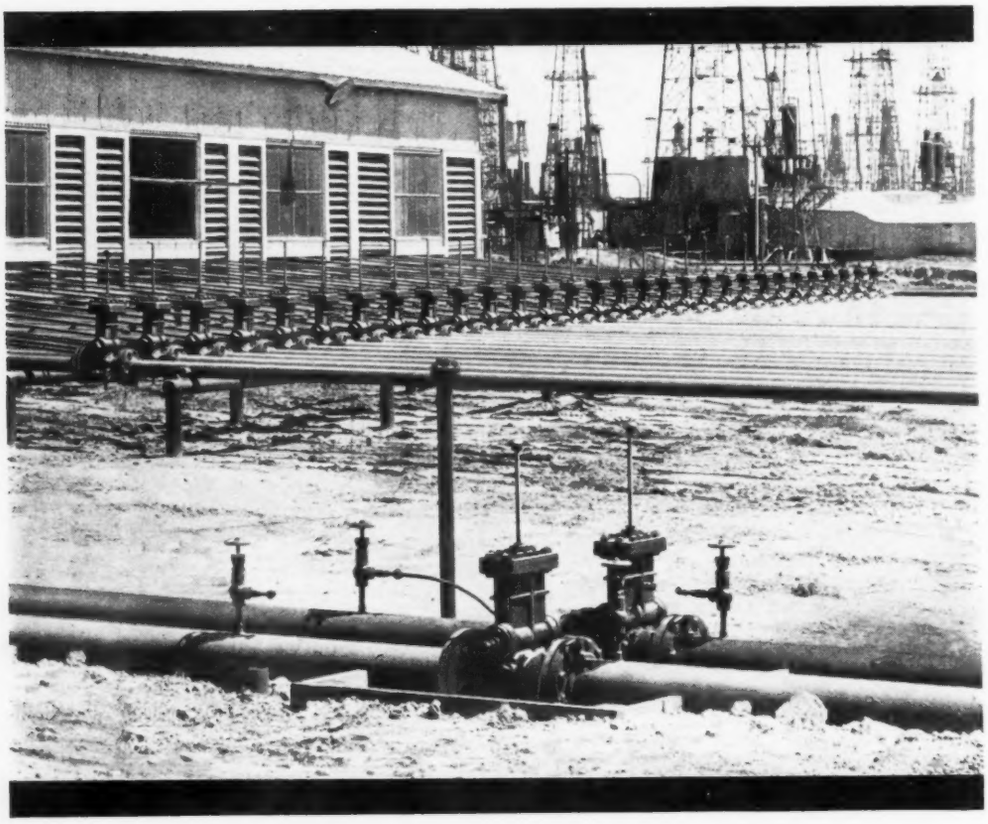
Genuine WICO parts and prompt service are assured to WICO users by the direct factory branch maintained in the heart of the mid-continent fields at Tulsa. It is maintained for you.

WICO ELECTRIC CO.
Springfield, Massachusetts
and
121 WEST 8th STREET TULSA, OKLAHOMA



WICO MAGNETOS

When writing WICO ELECTRIC COMPANY *please mention The Petroleum Engineer*



Robinson Orifice Fittings are indispensable wherever there is need for accurate and economical metering of gas, oil, air, steam and water through pipe lines. The illustration shows 32 of a total of 50 Robinson Orifice Fittings in service at a large Re-Pressuring Plant at Santa Fe Springs, Calif.

ACCURATE METERING

THROUGH PIPE LINES AT LOWEST COST

Every refinement in design—every advanced principle employed in Robinson Orifice Fittings accomplishes one purpose: *the most accurate metering through pipe lines at lowest cost.*

Robinson economy begins with the installation. One man can do the work that used to require several—and he does it in less time. The old style by-pass is eliminated. During plate changes the gas flow is not interrupted and there is no hazard. No chance of stopping gas flow or breaking orifice flanges.

The Robinson Orifice Fitting keeps orifice always centered. It effects great savings in materials and labor by eliminating practically all valves, tees, ells, couplings, etc. Plate changes are simplified, making plate removal for frequent inspection an easy matter. The Robinson Fitting occupies little space and can be mounted in almost any position. No gas loss and no hazard because there is no leakage during changes. Due to the elimination of the by-pass, all gas goes through the orifice of a Robinson Fitting to be accurately metered. These are among the scores of reasons why nearly 13,500 Robinsons are in use today and giving absolute satisfaction in terms of better metering at lowest cost!

ROBINSON ORIFICE FITTING COMPANY

1435 SANTA FE AVE. LOS ANGELES, CALIF.

Distributors:

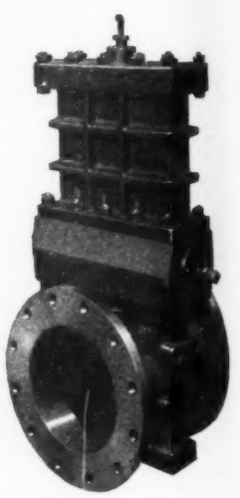
The Foxboro Company, Tulsa, Oklahoma; Dallas and Houston, Texas. Westcott & Greis, Inc., Tulsa, Oklahoma; Dallas and Houston, Texas.

ENGLISH DISTRIBUTORS:

Walker, Crosweller & Company, 54-58 Queen Elizabeth Street, London, S. E. No. 1

CANADIAN DISTRIBUTORS:

Peacock Bros., Ltd., Calgary, Toronto, Montreal, Winnipeg.

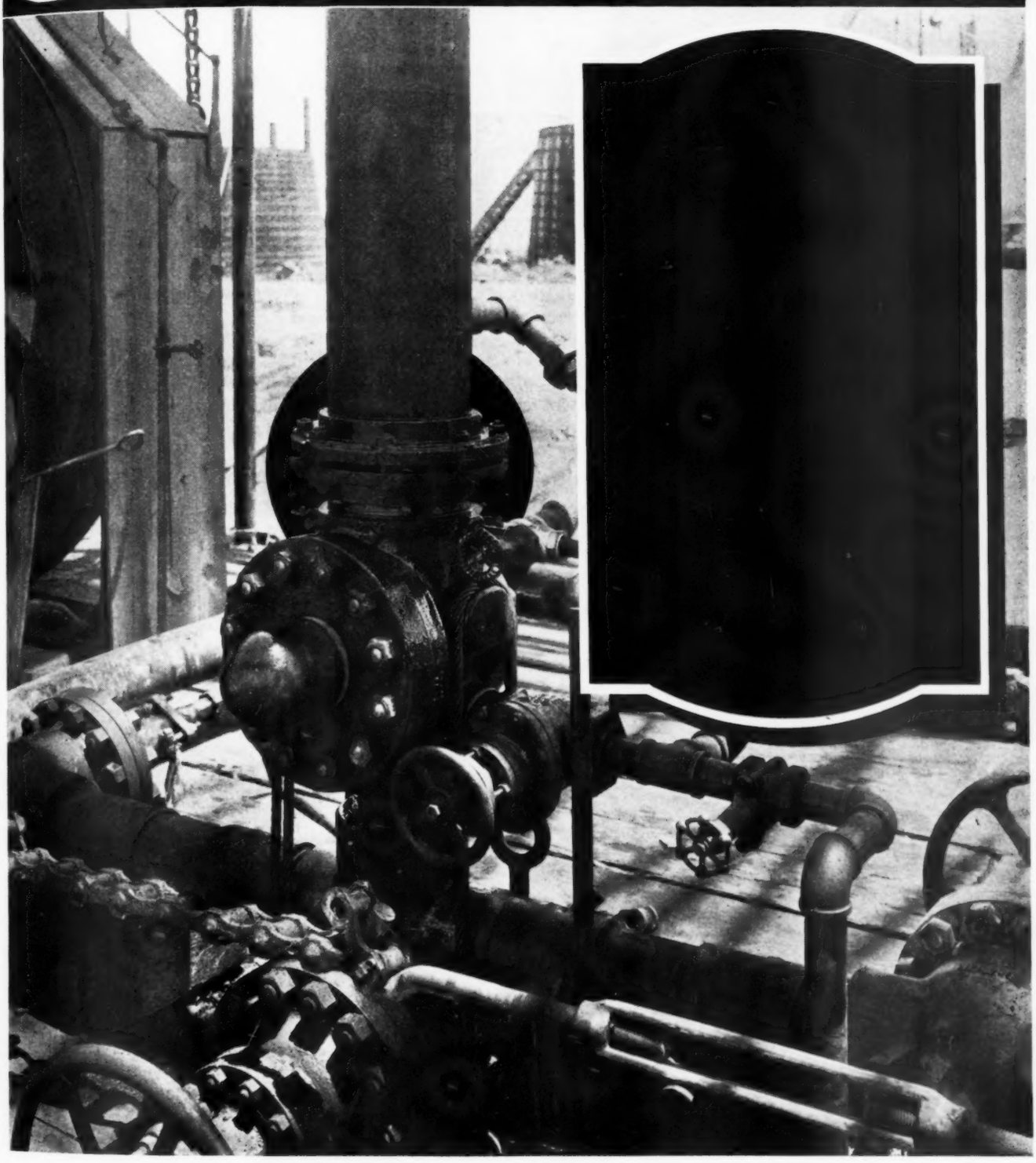


Note the extreme simplicity of the Robinson Orifice Fitting. No by-pass or complicated accessories of any kind. Efficiency plus, packed into little space, at little cost, to produce big results.

NEARLY 13,500 ROBINSONS IN USE TODAY

When writing Robinson Orifice Fitting Co. *please mention The Petroleum Engineer*

Jefferson Unions



DISTRIBUTED BY

INTERNATIONAL

TULSA *Supply Company* OKLA.

When writing INTERNATIONAL SUPPLY COMPANY *please mention The Petroleum Engineer*

FLUID PACKED PUMP
FPP

WHAT WE SAY TO OUR CUSTOMERS

The following excerpt was taken from a letter to a new user, operating beyond reach of any service points, who bought his first Fluid Packed Pump as a result of our advertising in the Petroleum Engineer:

"The Fluid Packed Pump is a departure from every other type of working barrel. It has no cups and by reason of the loose fit between tubes, it allows a free drop of the rods and overcomes a big percentage of sucker rod breaks by getting away from the slacking or buckling action that develops when a cup attachment or tight fitting plunger is forced into a barrel on the down stroke. We find that the majority of rod fractures are set up on the down stroke but actually develop on the up stroke from the shock load or starting jerk. You will also find that the actual pumping load is reduced by several hundred pounds, varying according to the well condition, and the usual lift to be felt on the polished rod is greatly reduced."

MID-CONTINENT REPRESENTATIVES FOR SHAFFER TOOL WORKS

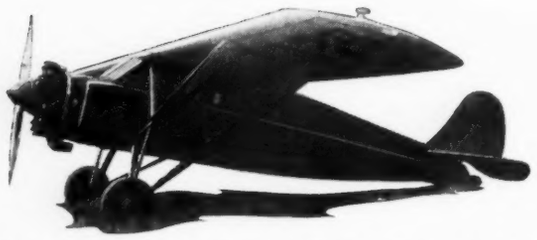
The idea of bringing wells in under control is becoming more general and promises in a short time to be standard practice.

In Oklahoma City we stock the Shaffer Cellar Control Gate, Olinda Casing Head and Shaffer Adjustable Flow Bean. Any or all of these items can be used to advantage in your well hook-ups.

SERVICE POINTS

OKLAHOMA: Tulsa, Drumright, Seminole. KANSAS: Winfield.
ARKANSAS: Smackover. LOUISIANA: Shreveport.
FACTORY: Los Nietos, California

YOUR NEIGHBOR KNOWS US!



FLUID PACKED PUMP COMPANY
Mid-Continent
FPP FPP

ROBERT N. ATMORE CO., Tulsa, Okla.

When writing FLUID PACKED PUMP COMPANY OR ROBT. N. ATMORE COMPANY *please mention The Petroleum Engineer*

BLACKOR

resists wear to the utmost and permits clean digging, faster digging and fewer changes of tools • • • • It is the genuine Abrasion-resistant that stops rapid abrasion on drilling tools • • • Try it yourself and note the difference • •

BLACKOR COMPANY

Head Office
13007 South Main St., Los Angeles, California
New York Export Office: 39 Cortlandt Street
Tulsa, Oklahoma, Office: 410 Thompson Bldg.
Houston, Texas, Office: 616 Public National Bank Bldg.

FULLY PROTECTED BY PATENTS

BLACKOR is granular in form, does the work of both hard-facing and insert materials. The genuine standard abrasive resistor. Always uniform. Can only be fused on with the carbon electric arc.

BLACKOR

The Super Abrasion-Resistant Facing

When writing BLACKOR COMPANY *please mention The Petroleum Engineer*

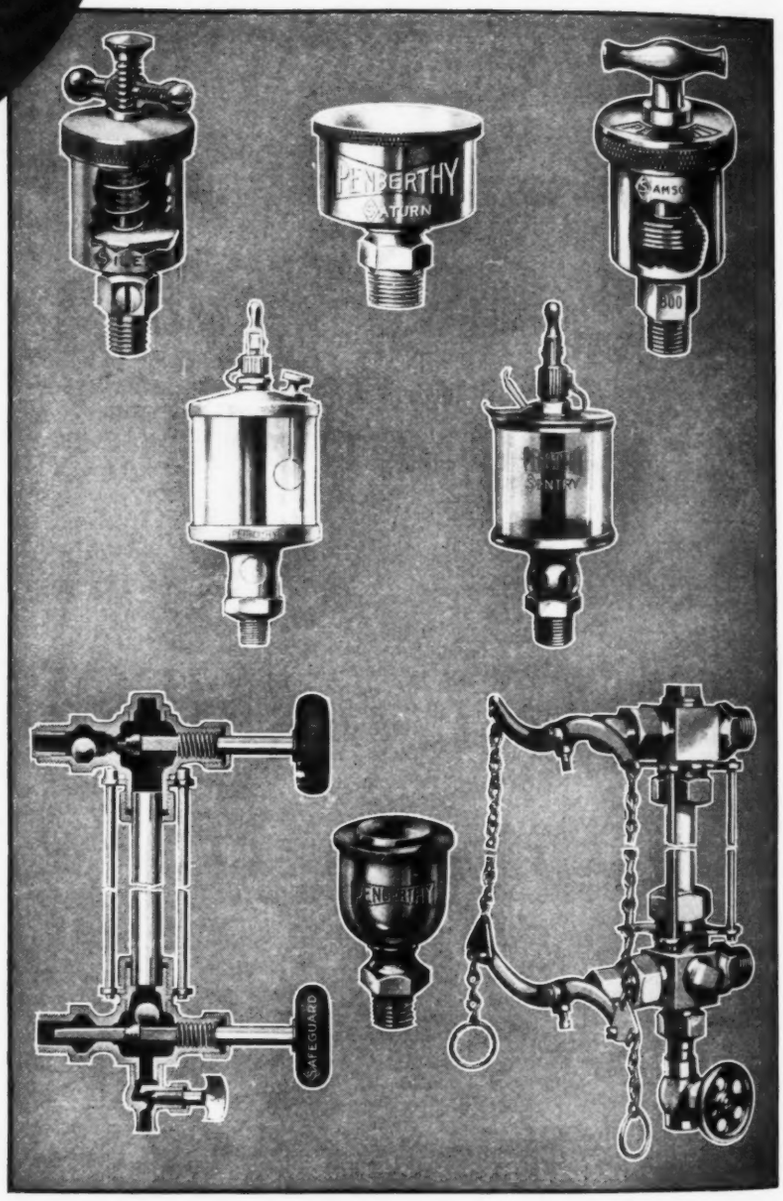
ECONOMY SUGGESTS

PENBERTHY PRODUCTS

THE fact that such a large number of operating organizations in the "Close Buyer" class have for years used only these injectors, liquid level gages and lubricating devices, is significant of the fundamental economy of Penberthy Products.

These Penberthy Products are cast from new brass . . . not made from spun or stamped brass. The design and workmanship allow for the rough handling that is probable.

Penberthy Products are carried in stock by supply companies everywhere.



PENBERTHY INJECTOR COMPANY

DETROIT

ESTABLISHED IN 1886

CANADIAN PLANT, WINDSOR, ONT.

BIG ROLLER BEARINGS KEEP TROUBLE AWAY *from the* COOPER-BESSEMER TYPE-16

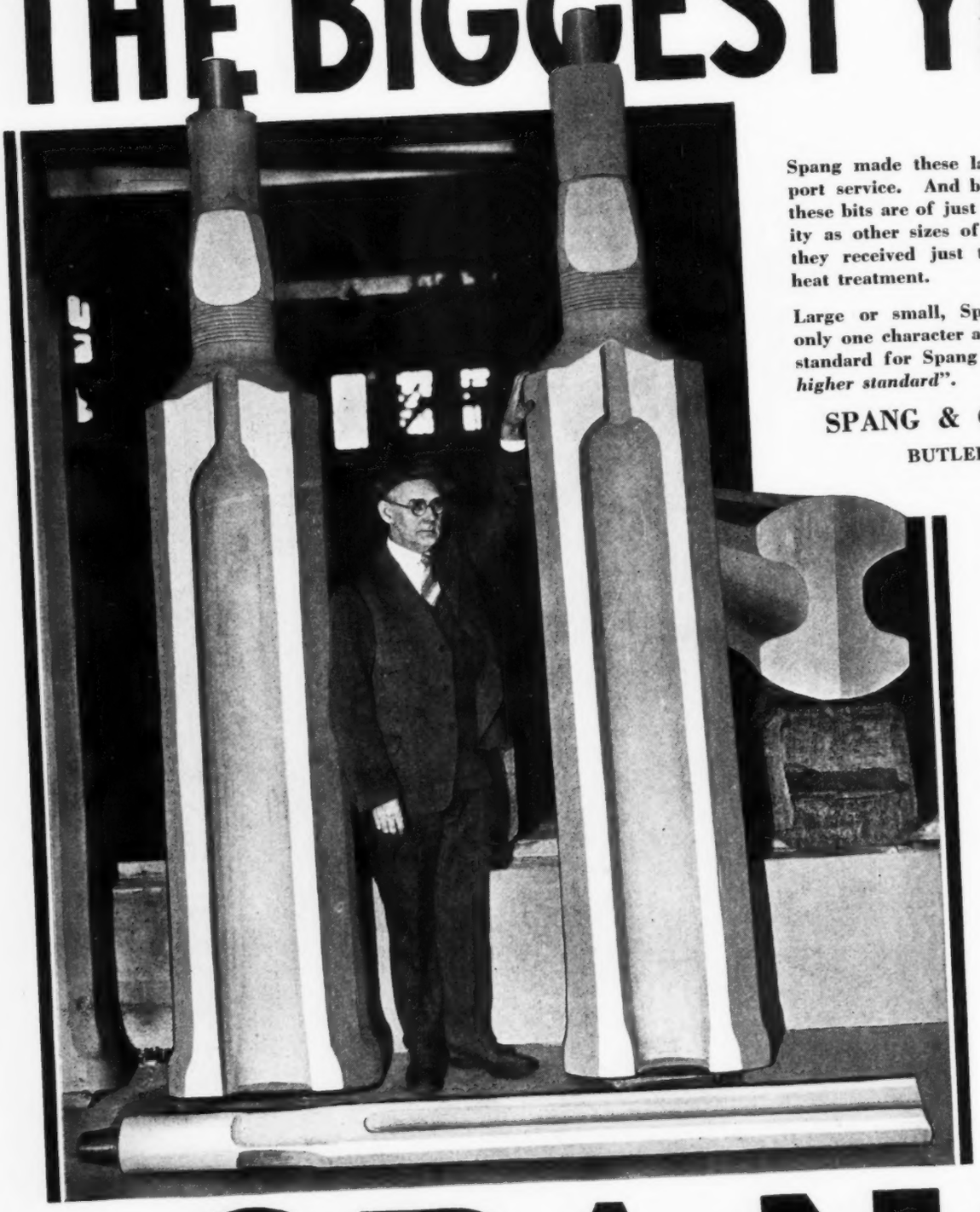
It has always been a policy with Cooper-Bessemer engineers to design with a high factor of safety. In specifying the main bearings for this 50-60 B. H. P. compressor unit, they selected a roller bearing with 50% over-strength. These Timken bearings were developed for railway freight car service. On the scores of Type-16's placed in service during the past three years THERE HAS NEVER BEEN A REPORT OF MAIN BEARING TROUBLE! Other important features are: convertibility from gas to oil fuel; a die-forged crankshaft; and unusual compactness because of the yoke type compressor drive. Ask for Bulletin.

YOU'RE ALWAYS SAFE IN CHOOSING A COOPER-BESSEMER

THE COOPER-BESSEMER CORPORATION, Mount Vernon, Ohio, Grove City, Pa.

When writing THE COOPER-BESSEMER CORP. *please mention The Petroleum Engineer*

THE BIGGEST YET



Spang made these large bits for export service. And big as they are—these bits are of just as splendid quality as other sizes of Spang bits, and they received just the same careful heat treatment.

Large or small, Spang Bits are of only one character as to quality. The standard for Spang is distinctly "*the higher standard*".

SPANG & COMPANY

BUTLER, PA.

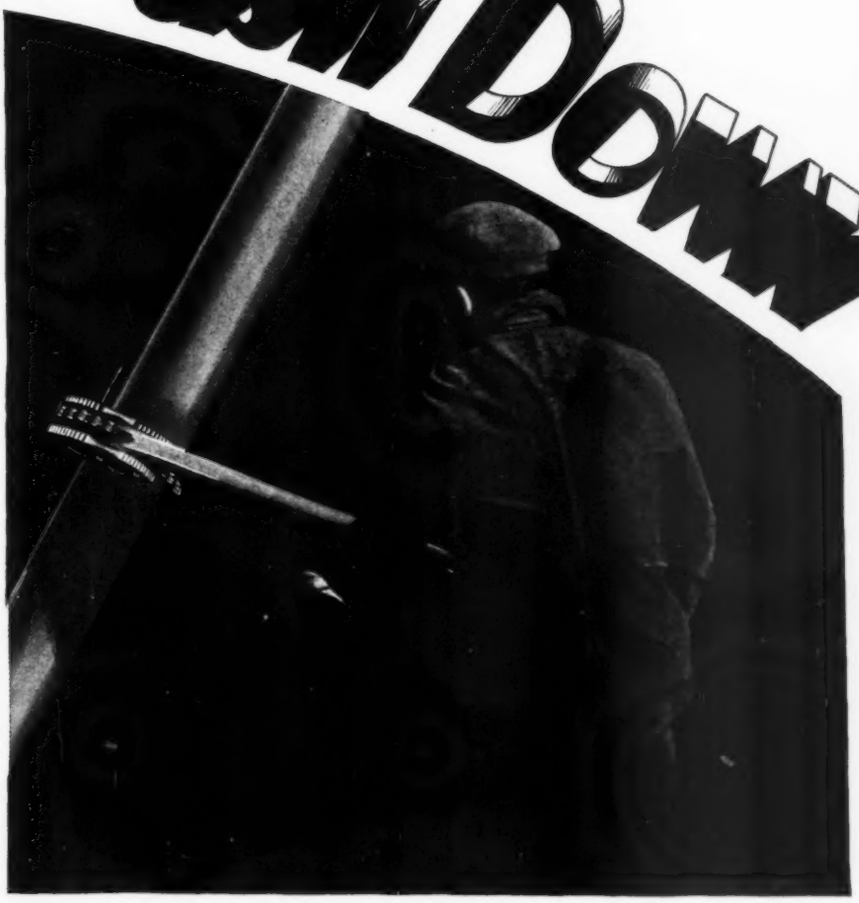
SPANG

The HIGHER STANDARD

DRILLING BITS

When writing SPANG & Co. *please mention The Petroleum Engineer*

Push Down



"MAKING UP"
Simply lay the tongs on top of pipe, hook chain around it, engage rearward teeth and push down.

Push down! That's all you have to do to "make up" pipe with Williams' new tongs.

"Vulcan Boll-Weevil" was designed for pipe line and flat pipe work. It was named for the men who use it. This tongs simplifies their labor. Note the description at the left.

"Vulcan Boll-Weevils" are fitted with reversible jaws providing double life. Chains are proof-tested and CERTIFIED. Four sizes for 3/4 to 12″ pipe.

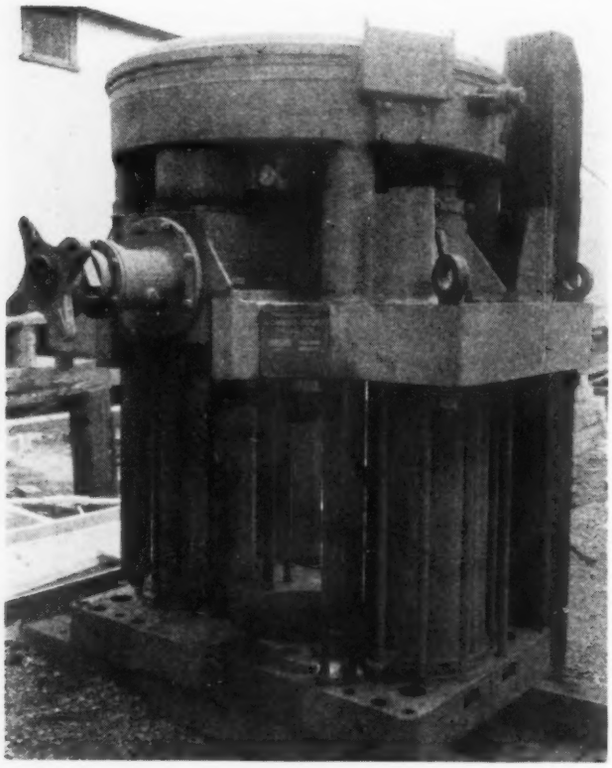
J. H. WILLIAMS & CO.
"The Wrench People"
New York BUFFALO Chicago

WILLIAMS
SUPERIOR DROP-FORGED TOOLS

VULCAN BOLL-WEEVIL CHAIN PIPE TONGS

Controlled • • • • • Drilling *with* HYDRIL

is the secret of a straighter hole, a better hole, and a surer well



HYDRIL ROTARY—Showing the TWO Hydraulic Jacks

The fundamental principle of drilling is control of the pressure on the bit. Through this rotary the pressure on the bit may positively and definitely be controlled within the limits known to be productive of best results. HYDRIL takes the "Chance" out of drilling.

6581 Feet in 46 Days

In the north Oklahoma City field where drilling conditions are most difficult—this well equipped with HYDRIL Rotary Equipment and Wilson-Snyder Slush Pumps made this very fast time.

Started rigging up	May 28
Drilling completed	Aug. 7
Total pay roll time	70 Days
Total time for rigging up, waiting on cement, coring and bailing	24 Days

Actual Drilling Time . . . . 46 Days

Distributed to the Mid-Continent Field by:

Wilson-Snyder Slush Pumps

Lawcore Bull Ropes

MURRAY TOOL & SUPPLY COMPANY
CLEVELAND, OKLAHOMA

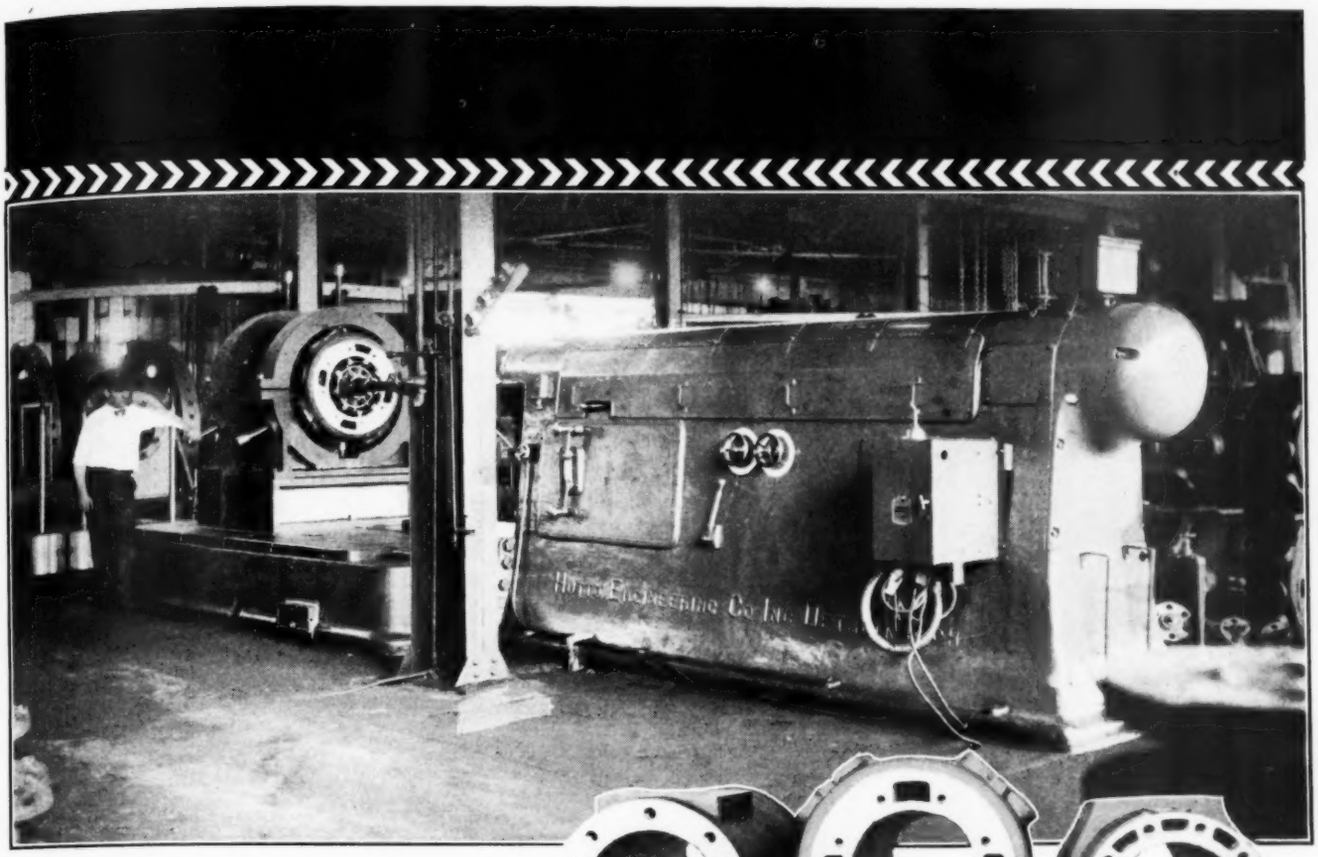
Universal Wire Lines

Hughes Rock Bits and Cones

STORES AT

Oklahoma City	Pawhuska	Seminole	Tulsa	Yale	Pampa, Texas	Wichita Heights, Kansas	Hobbs, New Mexico
Phone 3-7736	Phone 867	Phone 119	Phone 4-0144	Phone 55	Phone 894	Phone 4-3854	Phone 127

When writing MURRAY TOOL & SUPPLY COMPANY *please mention The Petroleum Engineer*



CYLINDER BORES ARE HONED TO A SMOOTH, MIRROR-LIKE SURFACE

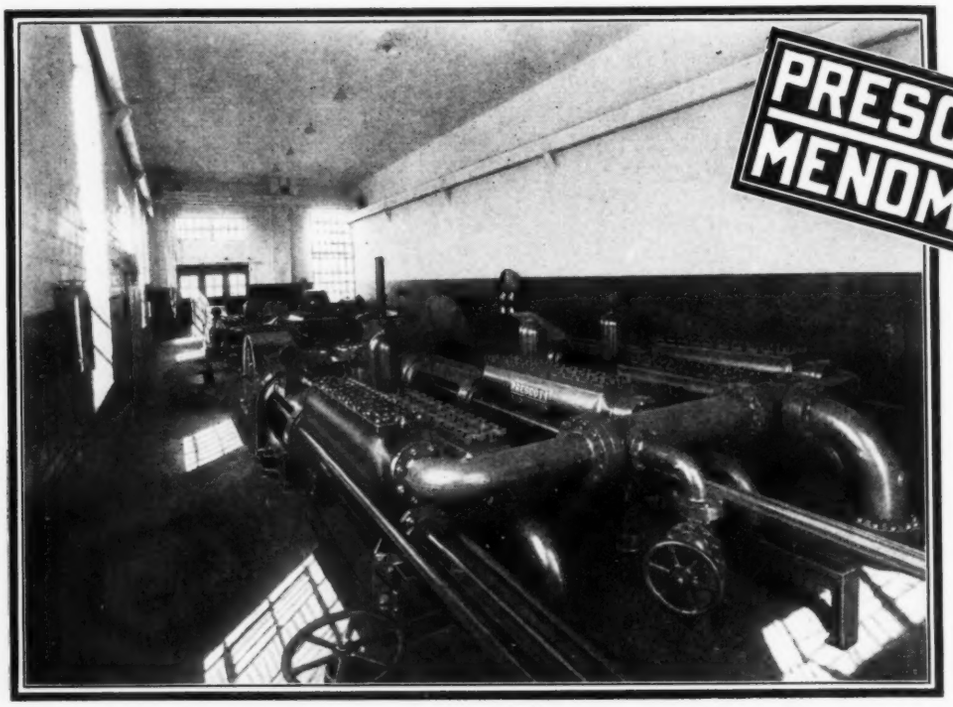
Above is shown a huge cylinder honing machine in operation in the CLARK plant. Below are shown cylinders after honing.

Buyers of CLARK Engines and Compressors now profit by another CLARK improvement—a honing process which puts a smooth, mirror-like surface on the bore of both power and compressor cylinders. Piston rings take a perfect fit with surprising quickness. Most of the first year's wear is eliminated . . . For more than 50 years Clark Bros. Company have given customers the benefit of every development which could improve the efficiency and economy of CLARK machines.

CLARK BROS. COMPANY
Olean, New York

Export Office: 150 Broadway, New York City. Mid-Continent Sales Offices: Tulsa and Fort Worth. Warehouses: Tulsa; McCamey and Sweetwater, Texas; Artesia, New Mexico. California: Smith, Booth, Usher Company, 228 South Central Ave., Los Angeles.

When writing CLARK BROS. CO. *please mention The Petroleum Engineer*



2—6" x 36" Prescott Horizontal Triplex Plunger Pumps. Daily capacity, each pump 36,000 Barrels. Main Line of Prairie Pipe Line Co., Shawnee, Oklahoma.

The PRESCOTT Guarantee is "built in"

CORRECT design, highest quality of materials, and careful manufacture constitute the only worthwhile guarantee of permanent satisfaction, and the widespread preference of pipe line operators for Prescott Reciprocating Plunger Pumps is the result of our adherence to those fundamentals.

Prescott Pumps have earned an enviable reputation for dependability and economy. They are readily adaptable to varying loads without loss of efficiency.

Whether it is oil or gasoline, Prescott can furnish just the pumps you need — any capacity — any pressure — and for either electric motor, gasoline or Diesel engine drive.

Write for catalogues and performance data.

THE PRESCOTT COMPANY

Menominee, Michigan, U. S. A.

Pumps for deep mines ~ Pumps for pipe lines

When writing THE PRESCOTT COMPANY *please mention The Petroleum Engineer*

PE9—Gray

"TESTED STRENGTH IN EVERY LENGTH"

CENTRAL WROUGHT • STEEL • PIPE

A 21 Year Achievement

IN this comparatively short time, the Central Tube Company has developed a nationwide distribution for Central Wrought Steel Pipe backed by a large modern manufacturing plant covering 14 acres at Ambridge, Pennsylvania.

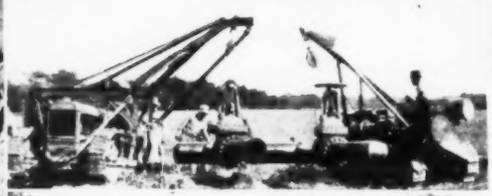
It required a pipe of outstanding merit to create this national demand in the face of established competition twenty years ago.

Today, with every modern manufacturing facility for the making of quality pipe, "Central" Wrought Steel Pipe is, more than ever before, enjoying a constantly increasing market and demand. Central Pipe satisfies the quality market!

CENTRAL TUBE COMPANY - PITTSBURGH

When writing CENTRAL TUBE COMPANY *please mention The Petroleum Engineer*

KEEPING AHEAD OF SCHEDULE!



JUST to finish on time is not all that Truman-Smith strives for. To finish ahead of schedule is their usual goal.

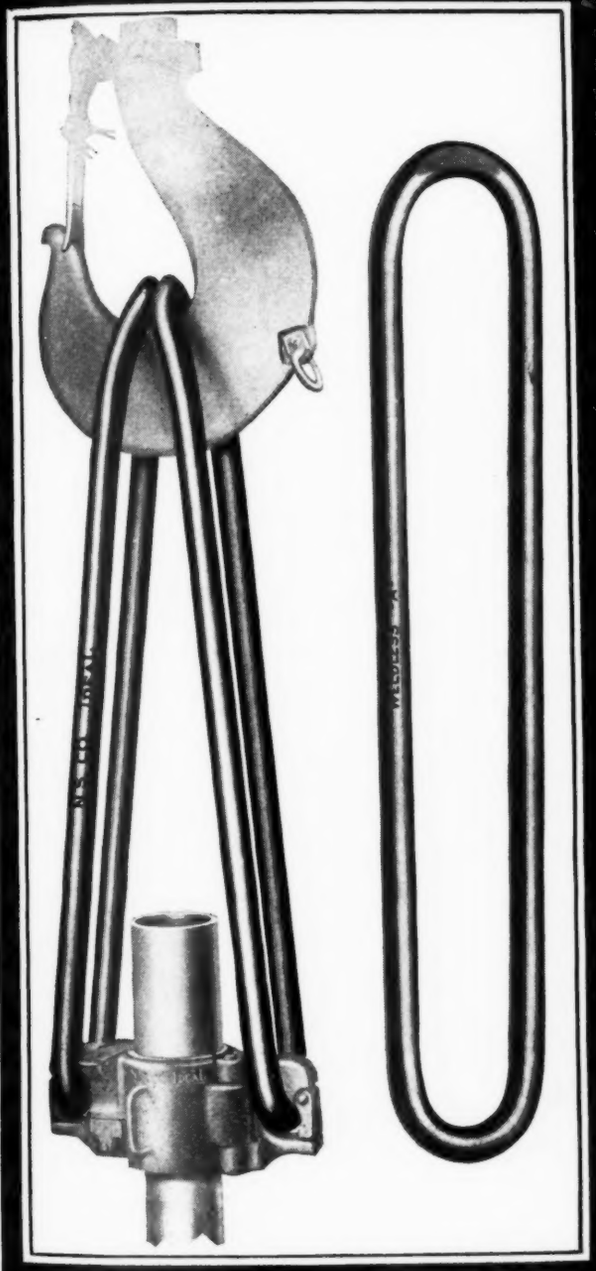
Mile after mile of pipe has been laid by this firm throughout the entire oil country. Experience, backed by ample equipment, has taught them how pipe should be laid and how to do the job the quickest.

And with all of their speed no detail is overlooked, or joint slighted. Every line is finished and delivered on time in first class leak-proof condition.

▼

The TRUMAN-SMITH CONST. Co.
EL DORADO, KANSAS.

IDEAL
WELDLESS
ELEVATOR LINKS

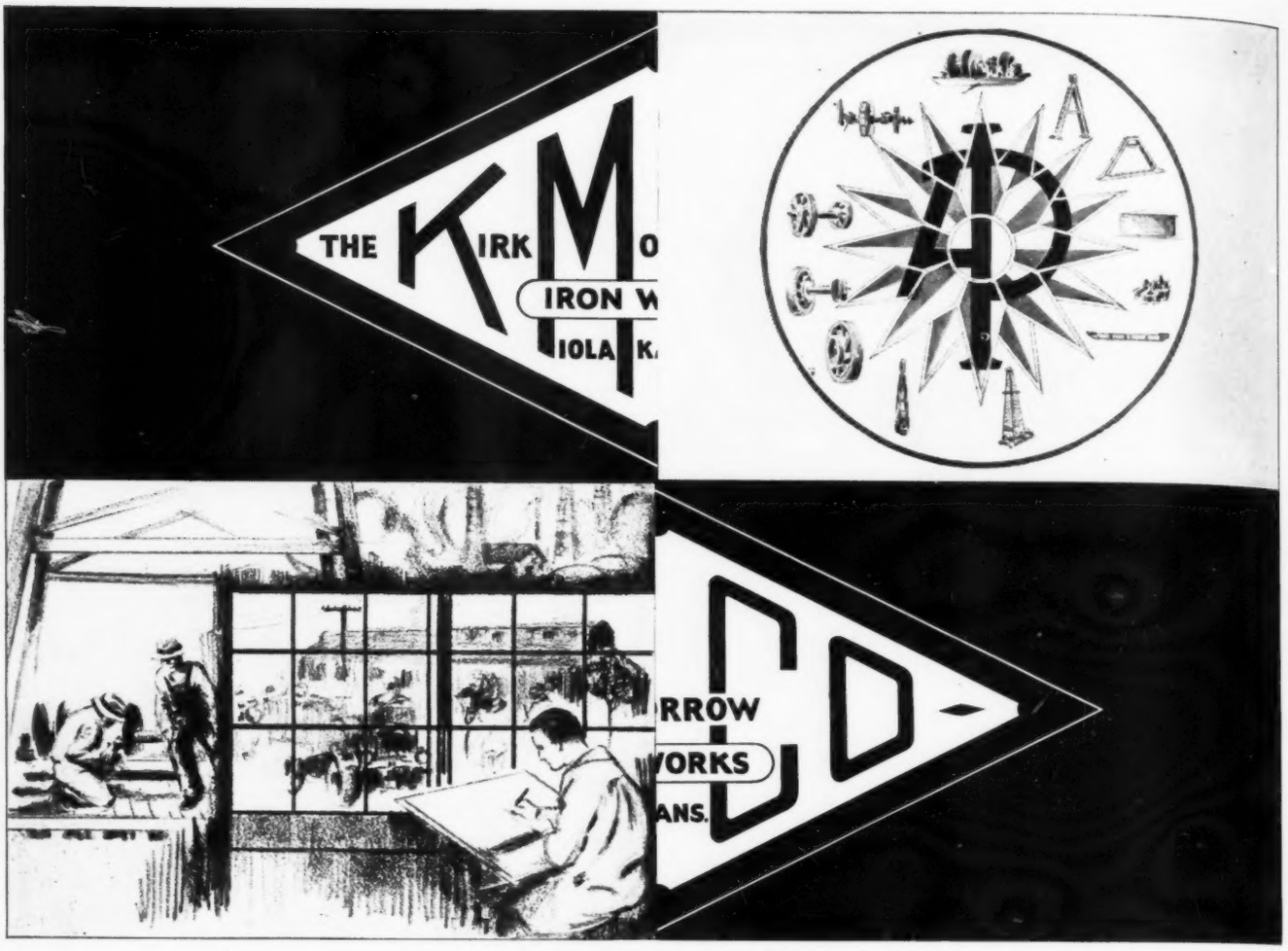


Forged from a continuous piece of Alloy Steel, heat treated

Links are interchangeable in sets

Descriptive Bulletin No. 88 Sent on Request

THE NATIONAL SUPPLY COMPANIES



ONLY THE HALF OF IT

The KM CO diamond on a product speaks volumes—but it tells only half the story. Behind the KM CO trade-mark there are not only the records of performance of a wide variety of products but also a history which extends over twenty-five years—a story of experience in the field—conferences with users of equipment—months spent analyzing particular needs, followed by extensive designs and models to make sure that the finished products would more than do what they were expected to do. Gather all this data on the pages of oil industry progress, bind it with the spirit of service which cements our organization together, then stamp the diamond trade-mark on the cover and you have the story of KM CO.

P R O D U C T S

Steel Derricks, Rig Irons, Bull Wheels, Band Wheels, Crown Blocks, Tug Wheels, Sand Reels, Steel Tankage, Floating Roofs, Tank Fittings, Refinery Equipment, Steel Plate Construction.

THE KIRK-MORROW IRON WORKS COMPANY

IOLA, KANSAS

Sales Offices: Hunt Bldg., Tulsa, Oklahoma; Magnolia Bldg., Dallas, Texas; Central Bldg., Wichita, Kansas

30 CHURCH STREET NEW YORK, N. Y.

With the deFLOREZ System *the operator can actually* Feel *the movement of the Distant Control*

Now a remote Control that *thinks*

There are some control devices that are merely motor-drives for opening and closing. And there are automatic controls that operate mechanisms to maintain control factors within specified limits. But none but a control that THINKS can adjust itself to meet changing needs and limits. Here it is—the deFlorez Remote Manual Control. Puts brain and hand of the man at the central control board behind the operation of the most distant machine or process unit. The operator actually feels the movement of the distant control mechanism.

Layout of deFlorez Remote Power Valve Control

Write for Bulletin No. 7520.

THE BROWN INSTRUMENT COMPANY
4475 Wayne Ave. Philadelphia, Pa.
Branches in 20 Principal Cities

Brown Instruments

"to measure is to economize"

When writing BROWN INSTRUMENT CO. *please mention The Petroleum Engineer*

PREVENT BLOWOUTS

WITH THE Shaffer Cellar Control Gate « «

COMPACT AND SAFE

Tested Up to

6000 lbs.

Cold Water Pressure

Most sizes of the Shaffer Cellar Control Gate will give a complete shut-off in 17 in. space. Made in all sizes from 7 to 21½ inches.

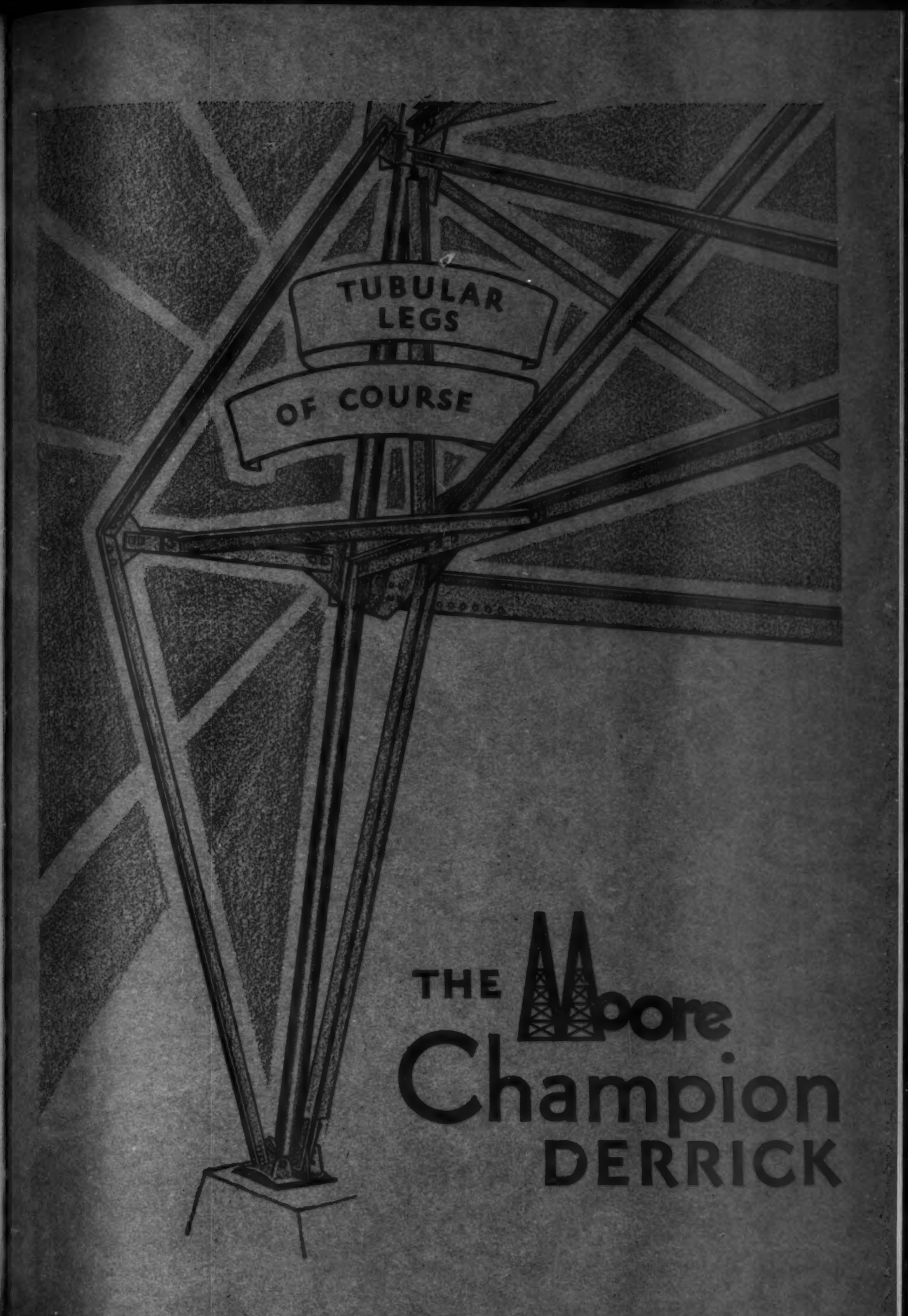
This simple, easily-operated device is positive in action—a complete unit in itself, that can be adapted to shut off around drill pipe, casing, or can be made into a master gate by using a complete shut-off arrangement. Two gates, one with rams for drill pipe, the other with rams for shut-off, give protection to the well and only take up about 36 inches of space in the cellar.

SHAFFER TOOL WORKS

BREA **CALIF.**

TULSA—Fluid Packed Pump Co., Mid-Continent
HOUSTON—Robt. J. Miller Co.
FOREIGN—Oil Well Supply Co.

When writing SHAFFER TOOL WORKS *please mention The Petroleum Engineer*


TUBULAR
LEGS
OF COURSE
THE Moore
Champion
DERRICK

YOU NEED MOORE LEG STRENGTH

Overloads, sudden strains, unusual conditions; these are so frequent in the oil country as to be considered normal. Such service calls for a derrick of exceptional stamina —the Moore Champion with tubular leg strength.

WHAT WING BRACING DOES

The bull wheel or draw works makes it necessary to omit the regular type of bracing in the first panel. To compensate for this, the Moore Champion has wing bracing on the outside of the structure. It is of structural steel, as is all Champion bracing, and is simple in design and easy of erection. This feature adds greatly to the rigidity of the derrick.

THE Moore Champion DERRICK

Moore ALL STEEL RIG EQUIPMENT

LEE C. MOORE AND COMPANY, INC.
PITTSBURGH Established 1907 TULSA
New York Offices
Oilfield Equipment Co., 30 Church Street, New York, N. Y.
DALLAS, TEXAS WICHITA, KANSAS CASPER, WYO.
SHREVEPORT, LA. HOUSTON, TEXAS
Stocks in All Principal Fields

Like the big Halliburton trucks, the Supervisors' cars are kept in perfect condition in Halliburton's shops—always ready to "get there somehow".

To assure adherence to the quality standards of the Halliburton Oil Well Cementing Co., a corps of Supervisors is ready, at a moment's notice, to travel to any point in the oil fields.

The duty of these Supervisors (seasoned cementing engineers, all of them) is to see to it that cementing contracts are fulfilled with skill and care; to make available to oil men the cementing knowledge gained through years of practical experience; to analyze *special problems* and suggest practical solutions.

Because eternal vigilance is the price of leadership, Halliburton guards with jealous care the reputation it has established.

HALLIBURTON
OIL WELL CEMENTING CO.
Duncan, Oklahoma

Containing information of interest to every oil man, THE CEMENTER will be sent to you free of all cost on receipt of the coupon.

Halliburton Oil Well Cementing Co.
Dept. PE, Duncan, Okla.

Without cost or obligation, please place my name on the list to receive THE CEMENTER regularly as issued.

Name .....

Company .....

Address .....

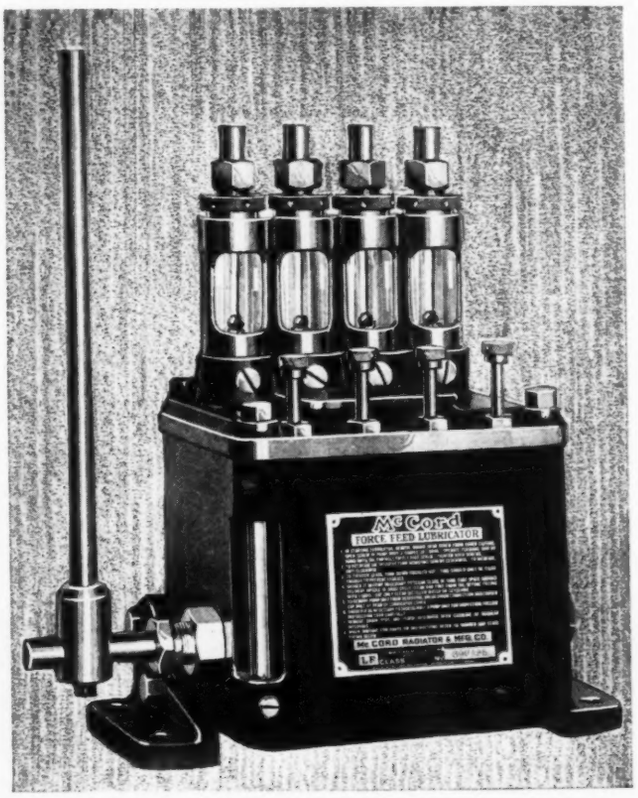
When writing HALLIBURTON OIL WELL CEMENTING CO. *please mention The Petroleum Engineer*

McCORD

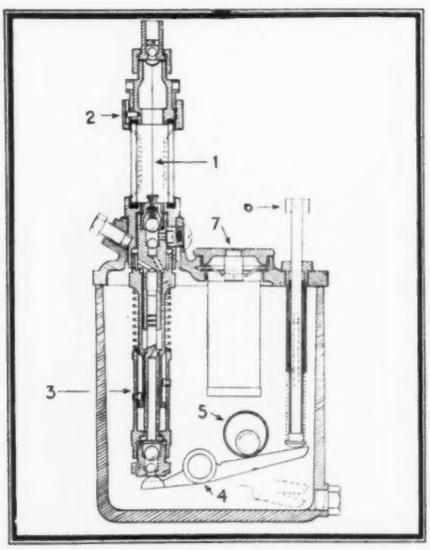
A BETTER LUBRICATOR

QUICKLY FILLED AND EFFECTIVELY CLEANED WITH LARGE FILLER OPENING AND STRAINER

The Filler Opening is provided with a deep, fine mesh strainer, having a capacity of 10 cubic inches, which is surrounded by 24 square inches of strainer screen. This large strainer area accounts for the quick filling, effective cleaning feature of the McCord "LF." A spring lid of novel design is another important part of the Filler Opening — it is securely attached to the lubricator, which eliminates any possibility of loss, yet it can be swung absolutely clear of the opening for filling. The Filler Opening, together with Strainer Screen and Spring Lid, can be seen in the drawing below (No. 7). Note the great strainer area described above.



The Filler Opening, being on the end of the lubricator, is completely out of the way of feed lines and other possible obstructions. The spring lid prevents any leakage of oil through the Filler Opening and at the same time prevents any foreign matter entering.

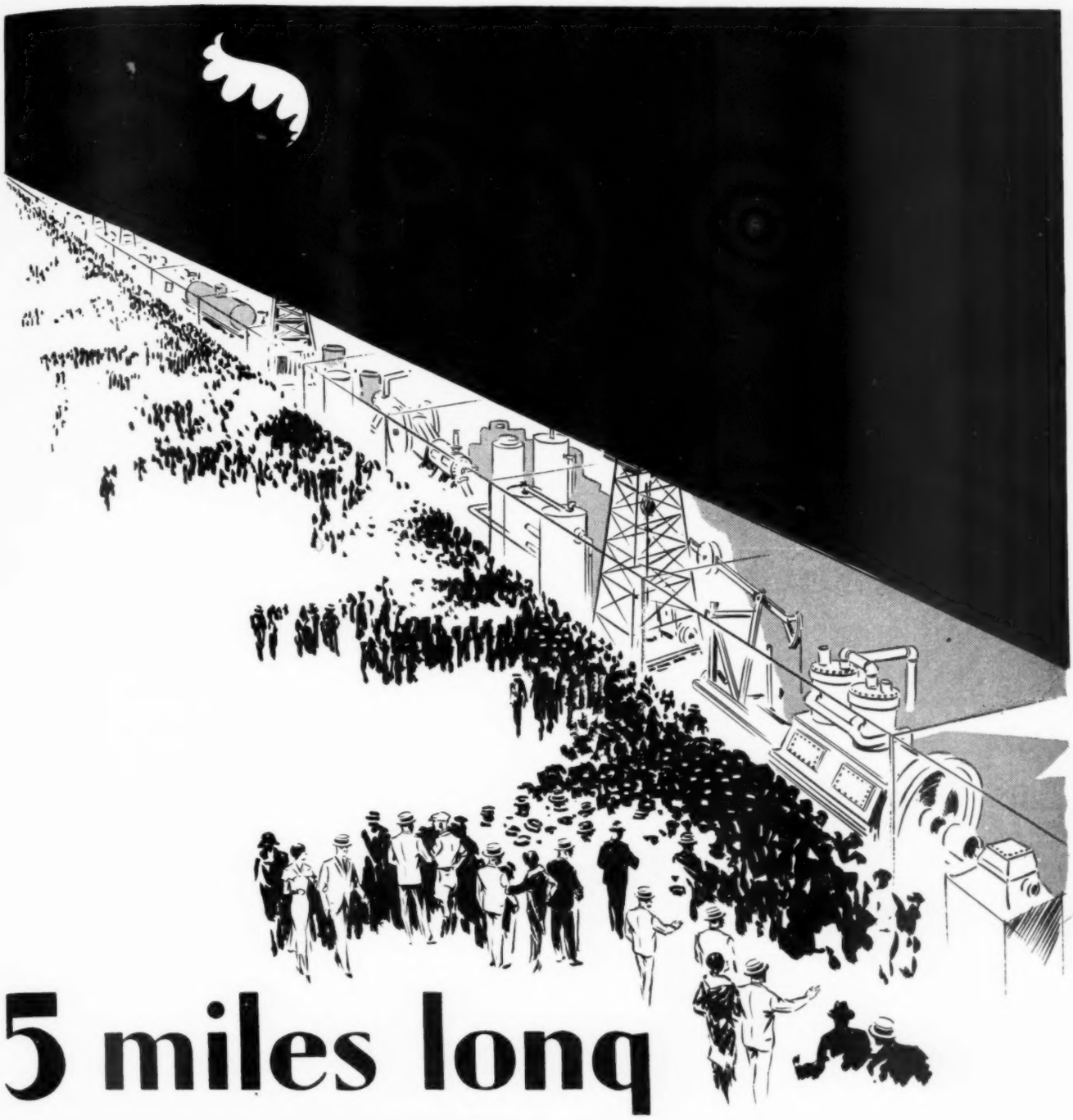


McCORD

RADIATOR & MFG. CO., DETROIT, MICH.

LUBRICATOR DIVISION

When writing McCord Radiator & Mfg. Co., Lubricator Division, *please mention The Petroleum Engineer*



5 miles long

Be in Tulsa Oct. 4th for this international market of petroleum equipment . . . see more and learn more at one time and place than you could discover otherwise by traveling many months and many thousands of miles. Get acquainted with ALL the new and improved methods and machinery for your branch of the industry, whether it be prospecting, producing, refining, transporting or marketing.

Larger Exposition grounds—added buildings—improved comfort facilities and conveniences. Reduced fares on all railways. Make your reservations now. For any information, address Wm. B. Way, Gen. Mgr., International Petroleum Exposition, Tulsa, Okla., U. S. A.

FISHER FACTS

that all point to ONE *conclusion:*

Every machine in the Fisher Governor Company's plant, including drill presses and boring mills, is built especially to perform a particular operation in the manufacture of Fisher dependable Specialties. Eighty-seven machines which perform some one accurate and special operation in the production line are in use at the present time and each machine is manned and operated by mechanics who take pride in knowing that every piece of equipment that leaves their hands approaches as nearly as possible to the perfection which is the Fisher standard.

Photograph above shows a close-up view of one of the machines which performs an important part in the production of Fisher dependable Specialties. The production of eighty-seven machines of this kind supplies the Oil and Gas Industry with Fisher dependable Specialties.

FISHER EQUIPMENT

OFFERS THE USER OF CONTROL AND REGULATING DEVICES A WIDER RANGE OF OPERATION, MORE EFFICIENT REGULATION, QUALITY MATERIAL, WITH MORE ECONOMICAL SERVICE.

"A Fisher Design in Every Line"

FISHER

The Fisher Governor Company

700 Fisher Building

Marshalltown, Iowa

HANLON-WATERS

INC.

General Offices : TULSA, OKLA. *Box 1404*

HOUSTON FORT WORTH MIDLAND, TEXAS

When writing HANLON-WATERS, INC., *please mention The Petroleum Engineer*

WINKLER-KOCH PROCESSES IN SOVIET RUSSIA

There is no project too large or too far away for Winkler-Koch Engineers to execute.

Wherever the most modern and efficient processes for refining petroleum are demanded, there Winkler-Koch equipment will be found.

Photos taken of Winkler-Koch distillation units installed at Batoum, U. S. S. R. of Russia.

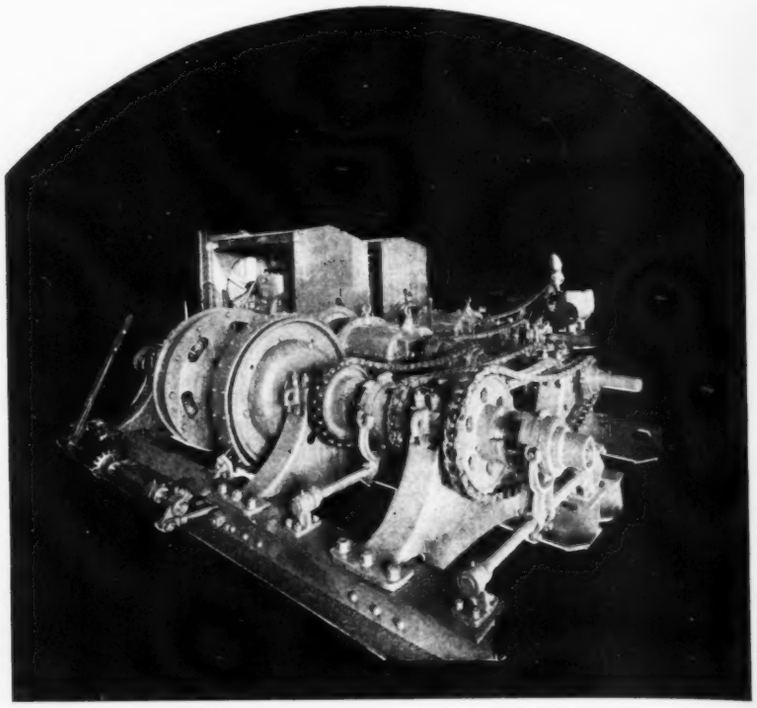
ENGLISH ASSOCIATE:
A. F. Craig & Co., Ltd.,
Paisley, Scotland.

EASTERN REPRESENTATIVE:
Frank deGanahl,
Grand Central Terminal Bldg.,
New York, N. Y.

The WINKLER-KOCH ENGINEERING CO.

Consulting and Construction Engineers
WICHITA, KANSAS

When writing THE WINKLER-KOCH ENGINEERING CO. *please mention The Petroleum Engineer*



Ease of Transporting Rig *and* Fuel
..a Boon to Operators in Isolated Districts

The search for productive oil sands leads scouts into regions that know no railroads . . . electric power . . . highways . . . and other facilities for drilling.

In such cases "Portable" rigs are by far the most economical and practical to use. They can be moved in easily . . . operated on a minimum amount of fuel and set-up with the least difficulty and delay.

Recently, a rig similar to the one above, performed most successfully under very adverse drilling conditions in an extremely isolated section. It was located on the Louisiana Gulf Coast and the mouth of Bayou Lafourche.

Here, it was 65 miles from a railroad in the midst of a swampy region. All equipment and supplies had to be barged 65 miles down the bayou to location. Fresh water was unavailable and the only other route leading to it was over thirty miles of swamp roads and a thirty-five-mile boat trip down the bayou.

This rig, although designed for only 5000 feet with 4-inch drill stem, completed its job by drilling to 6700 feet.

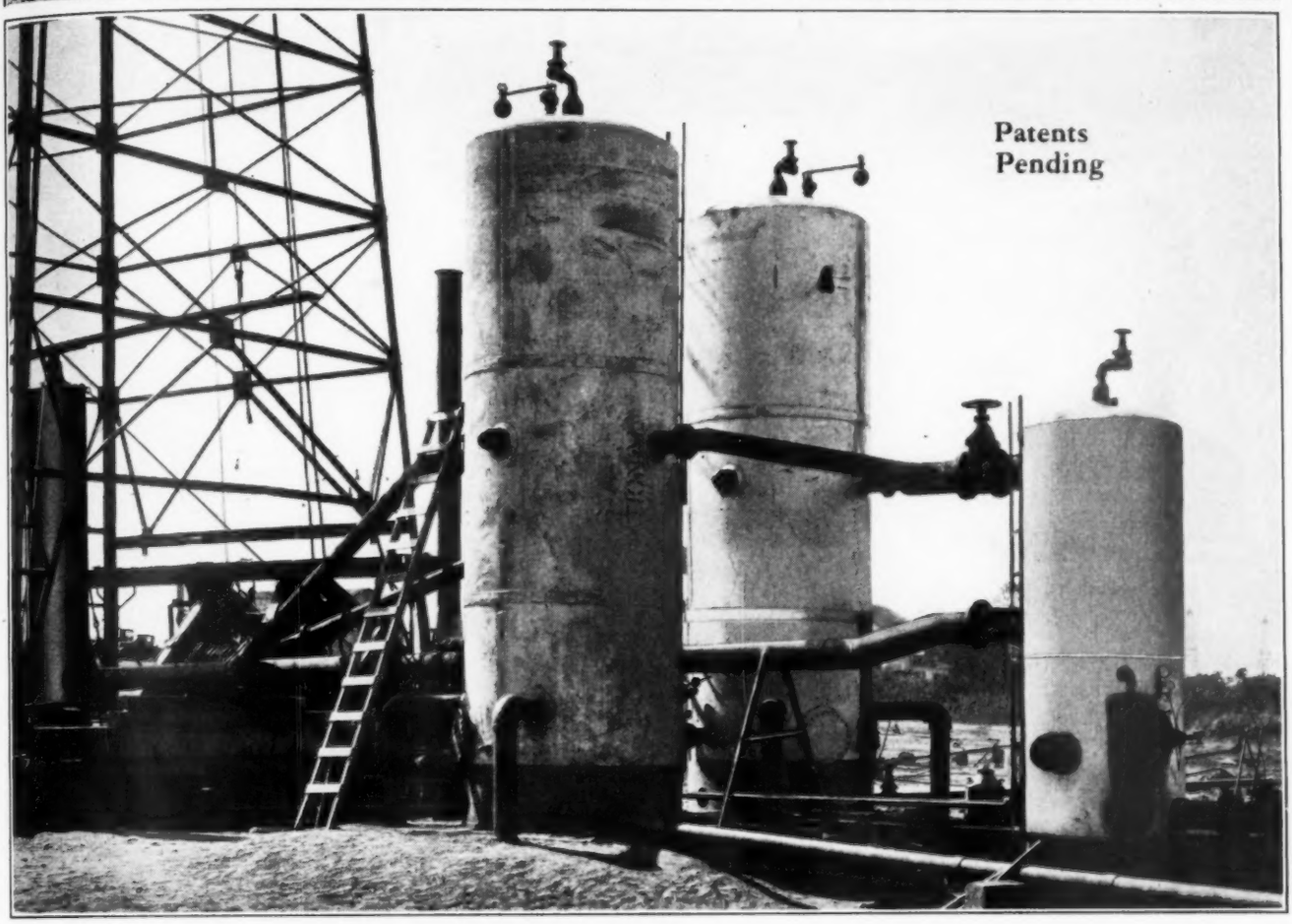
This is but one of numerous examples of remarkable performance under most difficult operating conditions.

Specifications on all Rigs comprising the "Portable" line will be found in our catalogue. For specifications on this specific rig, ask for Bulletin 300.

PORTABLE RIG CO. INC.
HOUSTON, TEXAS

When writing Portable Rig Co., Inc., *please mention The Petroleum Engineer*

National Method



SOLVES HIGH PRESSURE WELL PROBLEMS

Danger from Wild Gases---Loss of Oil---Damage to Valves Due to Sand Cutting---All Saved by New Sand Hog

From National Petroleum News—August 6, 1930

"Another safe method of bringing in the big town lot well at Oklahoma City has proven practical. It is known as the mud separator method. It is a solution to the problem of completing wells in the settled area.

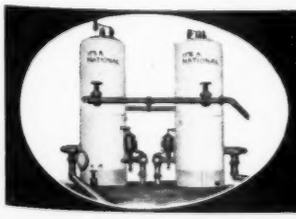
Its purpose is the cleaning of new wells without spraying the countryside with oil and mud. Results have been manifold. Aside from the elimination of the former wasteful practice of blowing the wells into the air, the new method greatly reduces the fire hazard.

The time required for the complete cleaning of a well varies from 30 to 45 minutes. When this is done the mud trap has served its purpose and is disconnected. After being cleaned it is then ready to be used on another location.

The sand hog on the derrick floor may be retained in the same position if the well shows a tendency to sand cut the fittings. This is quite characteristic of the sand wells at Oklahoma City, and the sand hog makes an ideal flow head.

The reduction of the fire hazard is obvious. But there is also a great saving in oil. It is claimed by the manufacturers and patentees, the National Tank Company, that this saving is sufficient on one well to pay for the installation."

● *A great deal of interest has been shown in this New National Way of bringing in wells and if you would like further data or information it will be cheerfully furnished on request.* ●



NATIONAL TANK ▼ ▼ CO.

TULSA OKLAHOMA

F. L. Kallam

F. L. Kallam has recently joined the staff of the Foster Wheeler Corporation. He is attached to the Los Angeles office and is chief engineer of the gasoline absorption and stabilizer departments.

Mr. Kallam is well known in the natural gasoline field, having been formerly connected with Shell Petroleum Corp., C. F. Braun & Co., Pan-American Petroleum Co., Southwestern Engineering Corp. and others.

ŏ ŏ ŏ

M. A. Abernathy, superintendent of gas measurement, Magnolia Gas Company, Bethany, La., was a recent visitor in Dallas and Tulsa.

ŏ ŏ ŏ

R. C. Grinnell of the Fluid Packed Pump Co., of Tulsa, Okla., accompanied by Mrs. Grinnell, is touring Yellowstone Park, Montana, Portland and Seattle, also San Francisco and Los Angeles. They will return to Tulsa about September 15.

ŏ ŏ ŏ

Ed C. Kopp, who for the last four years has been in the supply branch of the oil industry in West Texas, has joined the organization of Hanlon-Waters, Inc., as sales representative. He will make his headquarters at Midland, Texas.

ŏ ŏ ŏ

H. S. Austin, president of the Ajax Pipe Line Company, Tulsa, is on a trip to New York City.

ŏ ŏ ŏ

Leo Towers, formerly of The Texas-Empire Pipe Line Company, Tulsa, has joined the engineering department of the Great Lakes Pipe Line Company and is stationed at Ponca City, Okla.

L. S. Gregory

ŏ ŏ ŏ

L. S. Gregory has joined the firm of Black, Sivalls & Bryson, Inc. He was formerly consulting engineer with Whealton & Townsend, Inc.

ŏ ŏ ŏ

Marion Swaim, engineer with the National Supply Company (Midwest), Tulsa office, is back from a vacation trip that carried him through the Blue Ridge Mountains, Canada, and to the company's plant at Toledo, Ohio.

D. W. McKay is now in charge of sales of vertical engines in the Tulsa territory for the Cooper-Bessemer Corp. Mr. McKay started with the Cooper - Bessemer Corp. 27 years ago. More recently he has been with the Hope Engineering Company, serving as construction superintendent and later as manager of the Hope's Tulsa office. The Hope company was merged with the Cooper-Bessemer organization in 1928.

D. W. McKay

ŏ ŏ ŏ

C. E. Wright, district petroleum engineer with the Indian Territory Illuminating Oil Company at Oklahoma City, is back at his desk after a vacation trip to Yellowstone Park.

ŏ ŏ ŏ

Carl King, Tulsa, prominent Mid-Continent drilling contractor, made a flying week-end visit to Los Angeles last month in his new eight-place Travelair cabin plane. He took with him as a passenger on the trip C. F. ("Bud") Vincent, Byron Jackson representative in Oklahoma.

ŏ ŏ ŏ

Pat S. Lewis, president of the Resistcor Engineering Corp., Tulsa, has returned from a trip to Chicago and Milwaukee.

ŏ ŏ ŏ

Guy Danielson of Brauer Machine & Supply Company, Oklahoma City, returned shortly after the first of the month from his vacation.

ŏ ŏ ŏ

Walter Ritterbusch, formerly in charge of the Phillips Petroleum Company's offices at Fort Worth and San Angelo, Texas, is at present in charge of the right-of-way for the Phillips Pipe Line Company.

ŏ ŏ ŏ

J. E. Fenex, formerly at Wichita Falls with the Continental Oil Company, is now operating superintendent of that company's new Denver plant.

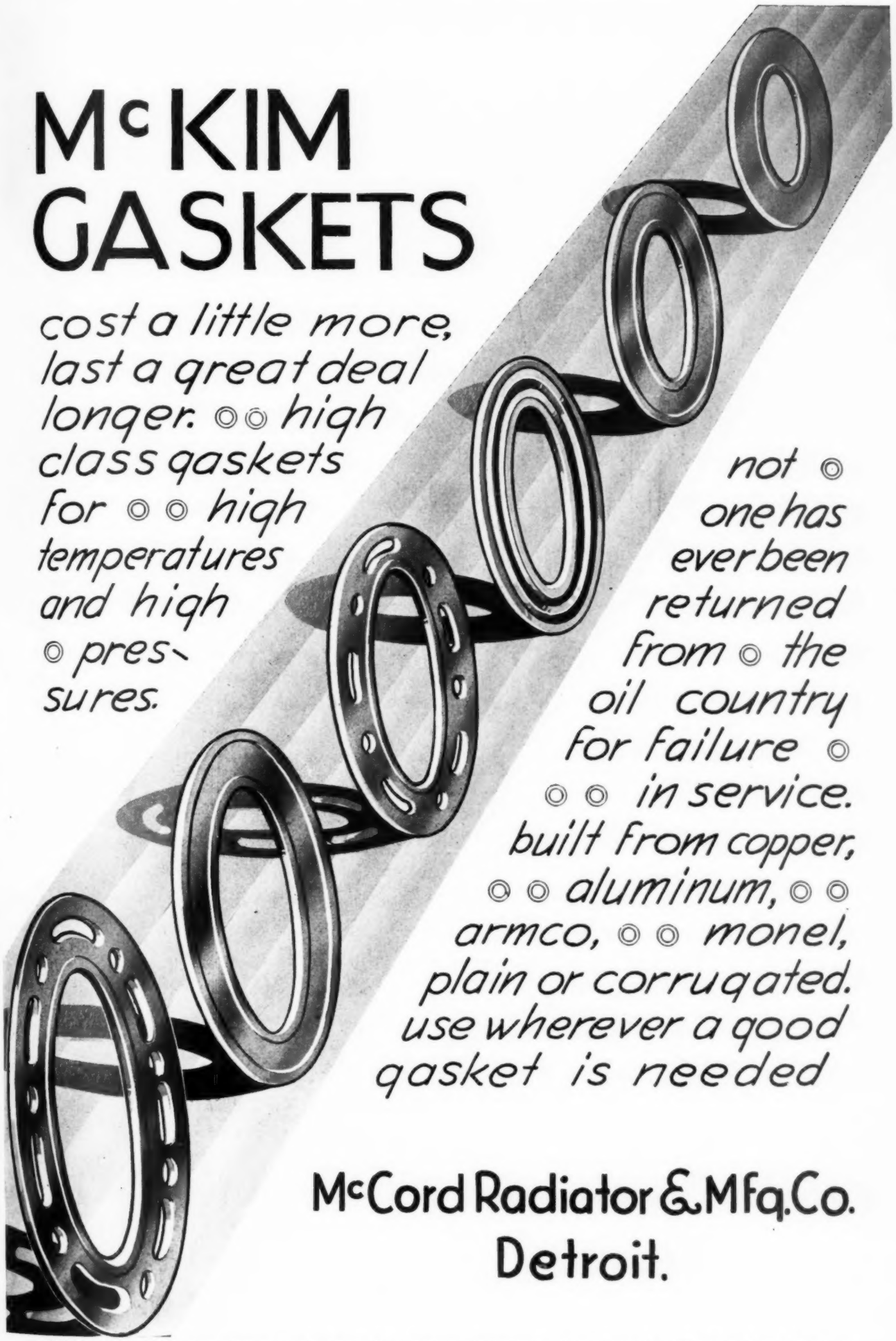
J. E. Fenex

ŏ ŏ ŏ

Mike Birmingham is the new district storekeeper of the Indian Territory Illuminating Oil Company at Oklahoma City, succeeding J. W. Harwood, now with Taubman Supply Corporation.

McKIM GASKETS

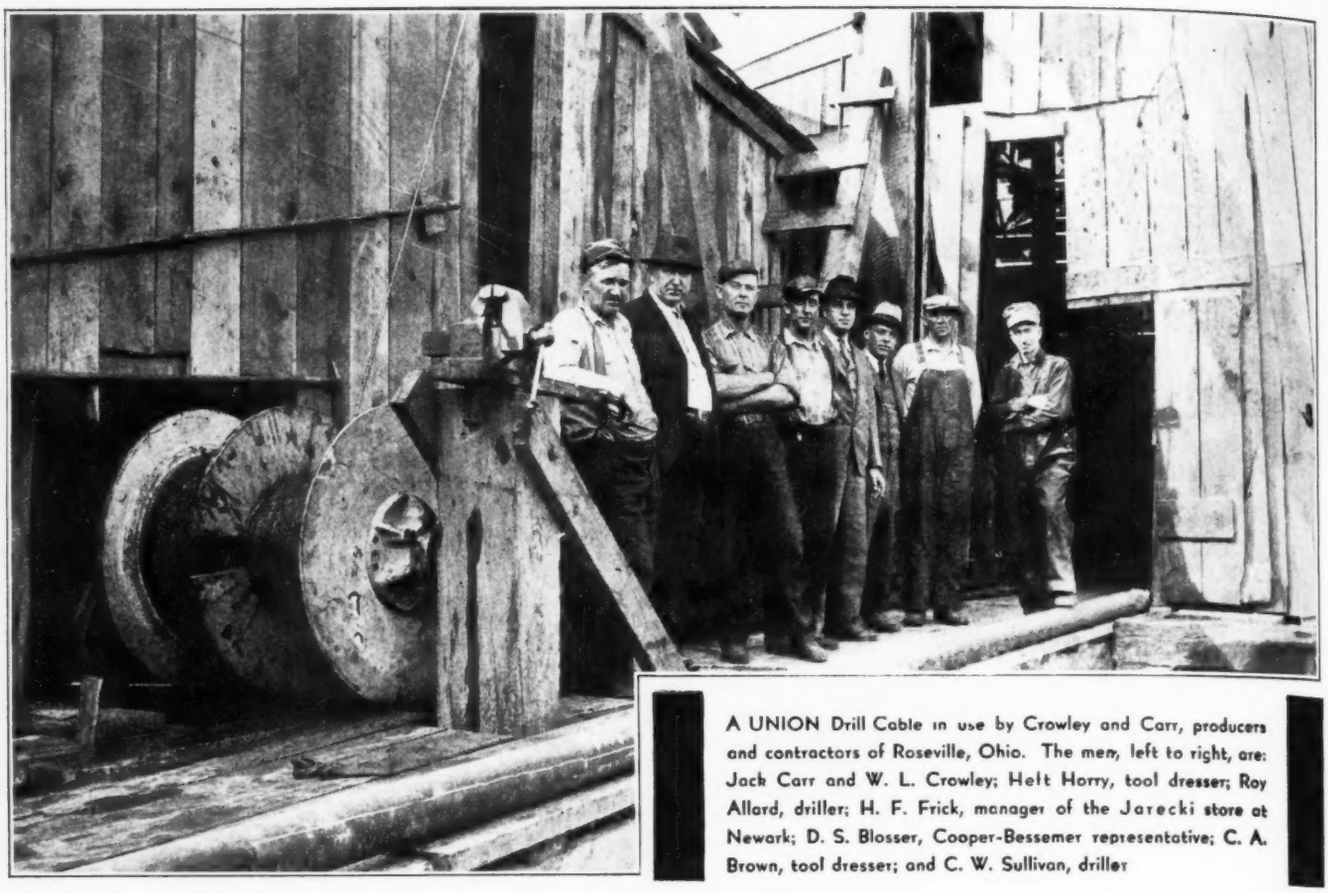
cost a little more, last a great deal longer. ◎◎ high class gaskets for ◎◎ high temperatures and high ◎ pressures.



not ◎ one has ever been returned from ◎ the oil country for failure ◎ ◎◎ in service. built from copper, ◎◎ aluminum, ◎◎ armco, ◎◎ monel, plain or corrugated. use wherever a good gasket is needed

McCord Radiator & Mfg. Co.
Detroit.

When writing McCord Radiator & Mfg. Co., Gasket Division, *please mention The Petroleum Engineer*



A UNION Drill Cable in use by Crowley and Carr, producers and contractors of Roseville, Ohio. The men, left to right, are: Jack Carr and W. L. Crowley; Helt Horry, tool dresser; Roy Allard, driller; H. F. Frick, manager of the Jarecki store at Newark; D. S. Blosser, Cooper-Bessemer representative; C. A. Brown, tool dresser; and C. W. Sullivan, driller

UNION ENDURANCE makes friends at Roseville, Ohio

This UNION Drilling Cable was used by Crowley and Carr to drill the largest producer in the Roseville Field to 3550 feet, and is shown on a direct offset to that well. Ohio, Texas or South America are all the same to UNION oil industry Wire Lines - - - they feel at home and do their stuff in any oil country. Correct design, plus precision manufacture, gives UNION Wire Lines the outstanding endurance which makes fast friends of users.

UNION WIRE ROPE CORPORATION
3 North Madison Ave., Tulsa, Oklahoma
Oil Country Sales and Export Offices: 338 Kennedy Bldg., Tulsa
Branch Office and Warehouse: Portland, Ore.
Factory: 21st and Manchester Kansas City, Mo.

JARECKI MANUFACTURING COMPANY
Mid-Continent and Eastern Oil Field Distributors . . . . . Stocks at All Stores

UNION WIRE ROPE CORP. TRADE MARK

UNION WIRE LINES

When writing Union Wire Rope Corp. *please mention The Petroleum Engineer*

A. O. Olson, president Olson Drilling Company, Tulsa, recently made a flying inspection of his company's activities in Wyoming and Hobbs, New Mexico.

George G. Oberfel, vice-president of Philfuels Corporation, Detroit, Mich., recently spent a few days in Bartlesville, Okla., on a business trip.

Lief Gullison, chief electrician for the Prairie Pipe Line Company, Tulsa, has returned from a two weeks' trip to Texas.

H. Whealton, president of Whealton & Townsend, Inc., has returned to his home in California after spending three weeks in the Mid-Continent territory.

"Spider" Allen, Tulsa representative of the Naylor Pipe Company, is on a month's vacation trip in Canada.

F. Ray McGrew, president of the Standard Pipe Line Company of Louisiana, with headquarters at Shreveport, spent a week in Tulsa recently.

N. H. Seymour, formerly lubricating chemist with the Chrysler Corporation, is now with The Ashland Refinery Company at Ashland, Ky.

W. M. Haynes, with the Continental Oil Company, Ponca City, Okla., is now acting as construction superintendent at the company's new Denver (Colo.) plant.

H. H. Herpst, appraisal engineer, vice-president and general manager of the Tultex Oil Company, and interested in several other oil activities, died suddenly on August 21 at San Antonio, Texas. He was buried at Titusville, Pa., on August 25.

P. J. McIntyre, vice-president of Phillips Petroleum Company, Bartlesville, Okla., has recently visited the company's office in San Angelo, Texas, which has supervision over West Texas and New Mexico.

W. H. Haynes

W. C. Trout, vice-president and general manager of the Lufkin Foundry and Machine Company, Lufkin, Texas, is in California calling on the various oil companies in that territory. Incidentally, he is renewing acquaintance with the six-months-old daughter of his son, Edward, who looks after the business of this institution on the West Coast. Mr. Trout is expected back at the home office in time to make the International Petroleum Exposition.

W. C. Trout

Timothy M. English, veteran California oil man and a well-known individual in the equipment field of the Pacific Coast territory, recently accepted a position with Frank T. Hickey Company of Los Angeles as the manager of the oil field division of this company. Mr. English's experience in the oil industry started in 1908 at Oil Center, Calif., when he joined the storekeeping staff of the Associated Oil Company.

T. M. English

Ray Jager, chief engineer, Prairie Pipe Line Company, Tulsa division, returned from a vacation in the northern states.

Willard C. Asbury, formerly with the Standard Oil Co. of Louisiana in the Baton Rouge research laboratory, has been placed in charge of chemical engineering, and Charles F. Hesselback, with the general engineering department of the Standard Oil Development Company, is now in charge of mechanical engineering for the Hydro Engineering and Chemical Company.

Marion W. Boyer has been appointed director of the development and research department of the Standard Oil Company of Louisiana, Baton Rouge, succeeding R. P. Russell, who has become general manager of the Hydro Engineering and Chemical Company.

Frank H. Rees is in the sales department of the Taylor Instrument Company, Tulsa. He will cover all the states in the Southwest territory. He was formerly in charge of instruments for the Continental Oil Company refineries.

Jack Glennon, chief boiler inspector for the General Petroleum Corporation, is president of the Certified Oil and Railroad Boiler Engineers' Association, a California organization.

George M. Maverick is the new director of research laboratories of the Standard Oil Development Co., Bayonne, New Jersey.

W. G. Ray of the W. G. Ray Drilling Co., Shreveport, La., has moved to San Antonio, Texas, where he is operating in the Pettus district of Bee County.

J. J. Small has been transferred from the Standard Oil Co. of Louisiana to the patent department of the Standard Oil Development Co.

E. H. Skinner, formerly chief clerk for the pipe line department of the Continental Oil Company, has been appointed manager of the department. Harry Moreland, former manager, has been made vice-president and general manager of the Great Lakes Pipe Line Company.

J. C. Mann, International Supply Company, has returned to Tulsa from a vacation spent in Long Beach, Calif.

Edited by **BARNEY HORRIGAN**

Fair Size

The young farmers were boasting about the size of vegetables they had grown. Finally, one of them turned to Uncle Seth.

"What was the biggest thing you raised this year, Uncle Seth?"

"A squash."

"Well, how big was it?"

"We never measured it," drawled Uncle Seth, "but we used the seeds for snowshoes."—*Boston Transcript.*

ꕥ ꕥ ꕥ ꕥ

Like Father, Like Son

"Bobby, why are you so unkind to nurse? Don't you like her?"

"No, I hate her. I'd like to pinch her cheeks like daddy does."

ꕥ ꕥ ꕥ ꕥ

Mrs. Mosquito: Where is your daughter?

Mrs. Housefly: She just went to the front door for screen test.

ꕥ ꕥ ꕥ ꕥ

Last Hope

The squad of recruits had been taken out to the rifle range for their first try at marksmanship. They knelt at 250 yards and fired. Not a hit. They were moved up to 200 yards. Not a hit. They tried it at 100. Not a hit.

"Tenshun!" the sergeant bawled. "Fix bayonets! Charge! It's your only chance!"

ꕥ ꕥ ꕥ ꕥ

Different

Census Taker: "What is your husband's name?"

Mrs. Murphy: "Pat."

Census Taker: "I want his full name."

Mrs. Murphy: "Well, when he's full, he thinks he's Gene Tunney."

ꕥ ꕥ ꕥ ꕥ

A Daughter of Eve

He had been to a stag dinner and his wife wanted to hear all about it when he got home.

"Well," he said, "one rather odd thing occurred. Jim Blankton got up and left the table because some fellow told a story that he didn't approve of."

"How noble of Mr. Blankton," exclaimed the wife, "and what was the story, John?"

Working

Living Skeleton—What became of our fat man and his wife?

Indian Rubber Man—They got jobs posing for that future shadow in the Lucky Strike ads.

ꕥ ꕥ ꕥ ꕥ

The One

Ole—Aye want to take this book from de library.

Librarian—This, "Ben Hur?"

Ole—Yas, dat ban she.

ꕥ ꕥ ꕥ ꕥ

His Record

Old Lady (about to go up in airplane)—Oh, Mr. Pilot, you will bring me back all right, won't you?

Pilot—Yes, indeed, madam; I've never left anybody up there yet.

ꕥ ꕥ ꕥ ꕥ

Pious Bill

Alpha—What was the denomination of that bill you loaned me?

Theta—Episcopalian, I guess; it keeps lent.—Flamingo.

ꕥ ꕥ ꕥ ꕥ

The End

And speaking of hazardous occupations, there's the window washer and the steeplejack and the steel worker, and then there's the Editor who dropped 11 stories into the waste basket.—The Commonwealther.

ꕥ ꕥ ꕥ ꕥ

Proving Again—It Pays to Advertise

"I advertised that the poor would be welcome in this church," said the minister, "and after inspecting the collection, I see that they have come!"

ꕥ ꕥ ꕥ ꕥ

Willing Pupil

Irate Parent: "I'll teach you to make love to my daughter, sir."

Young Man: "I wish you would, old boy, I'm not making much headway."—Two Bells.

ꕥ ꕥ ꕥ ꕥ

The first time a Scotchman used the free air at the garage, he blew out all four tires.

The Rest Cure

Doctor (to wealthy patient): Yes, you're all run down. I suggest that you lay off golf for a while, return to business, and get a good rest at your office.

ꕥ ꕥ ꕥ ꕥ

Familiar Sound

They were seated at a table in a night club. Suddenly there was a loud crash.

"Come," he said, taking her hand, "let's dance."

"Don't be foolish," she answered, "that wasn't the orchestra. The waiter dropped a tray of dishes."

ꕥ ꕥ ꕥ ꕥ

The End

Bob: Cheer up, Bill; it's time to kiss the bride.

Bill: You're wrong; it's time for me to quit.—*Detroit News.*

ꕥ ꕥ ꕥ ꕥ

Always

He (as they drove along a lonely road): You look lovelier to me every minute. Do you know what that's a sign of?

She: Sure, you're about to run out of gas.

ꕥ ꕥ ꕥ ꕥ

Unsafe

A prize fighter was walking along Sixth avenue. As he passed a fur store one of the pieces in the window caught his eye. Entering the store, he accosted the man behind the counter.

"I'd like to buy a fur for my girl," he said.

"Yes," said the storekeeper. "We have all kinds. Here's a silver fox, six hundred and twenty-five dollars."

"I can't pay that much!" interjected the prize fighter. "How about the black and white ones I saw in the window?"

"Oh, you mean skunk," said the shopkeeper. And then everything went black.—*Ex.*

ꕥ ꕥ ꕥ ꕥ

Boy Who Made Good

Null: "I started out on the theory that the world has an opening for me."

Void: "And you found it."

Null: "Well, rather. I'm in the hole now."—Churchman.

ONE MAN AND THIS RIDGID SUPER-WRENCH WILL TURN MORE TIGHT FITTINGS THAN THREE MEN WITH AN ORDINARY PIPE WRENCH

RIDGID
SUPER-SIX and SUPER-FOUR
CAPACITIES 2″ to 6″ and 1½″ to 4½″

COMPOUND LEVERAGE

10 times the leverage of regular 36″ and 48″ wrench gives it tremendous power.

A ONE-MAN WRENCH

One man with a Super-Wrench can loosen the rustiest 6 in. fitting on the line. No need to smash fittings. No need for two or three men or couple of yards of pipe hanging on the handle . . , Also the Super-Wrench tightens a fitting without disturbing joints already tight in the line.

FOR TIGHT PLACES

In narrow trenches or other tight places, the Super-Wrench, with its short handle and powerful leverage, is the ideal tool.

PAYS FOR ITSELF ON ONE TEAR-DOWN JOB

A statement made about lots of tools and machines—but in this case it actually does it, on one good tear-down job saving enough in labor and fittings to more than equal its cost. Every kit should contain at least one of these Super-Wrenches. See your jobber.

AND THESE OTHER FOUR REMARKABLE RIDGID PIPE TOOLS

RIDGID WRENCHES
Housing guaranteed against break or warp. Nut in open housing easy to adjust. Can't lock on pipe. Powerful I-Beam handle with hang-up hole. Sizes 6″ to 60″.

RIDGID CUTTERS
With quickly replaceable "Blue Ridge" blade of special steel—far more cuts, clean and burrless, lower cost.

RIDGID VISES
Bench, post, stand vises, yoke and chain types—with no-mar jaws, pipe rests and benders.

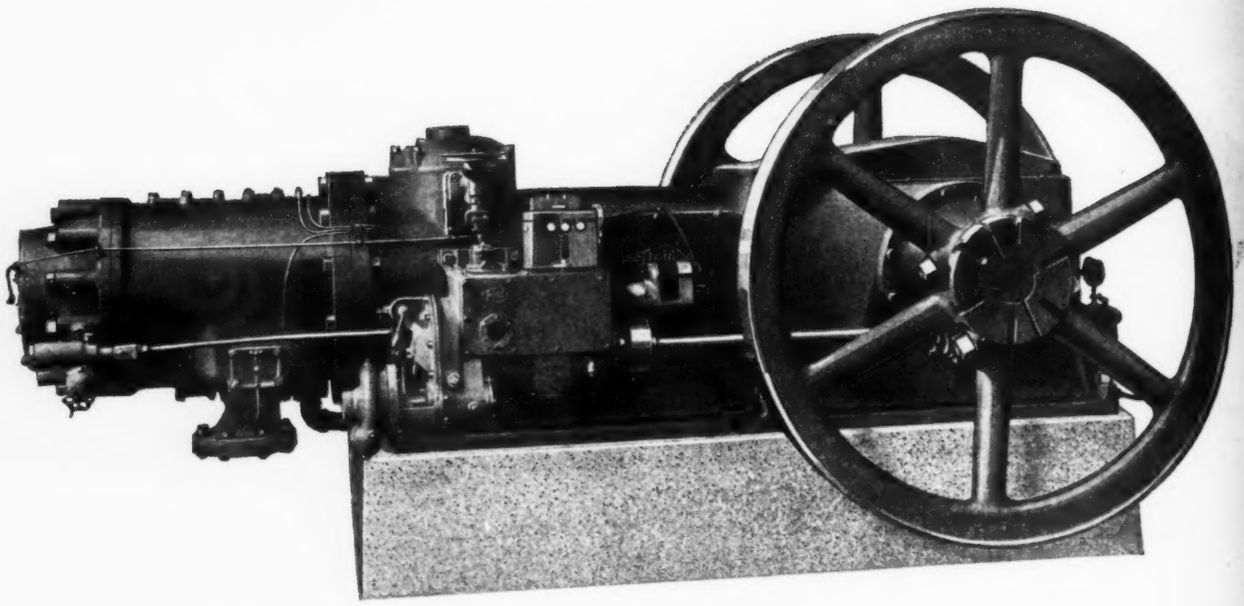
RIDGID DIE STOCK
One set of new style chasers threads 4 sizes pipe (1 in. to 2 in.). Remarkable new work-holder, one screw centering device.

THE RIDGE TOOL COMPANY Dept. PE **Elyria, Ohio**

RIDGID
PIPE TOOLS

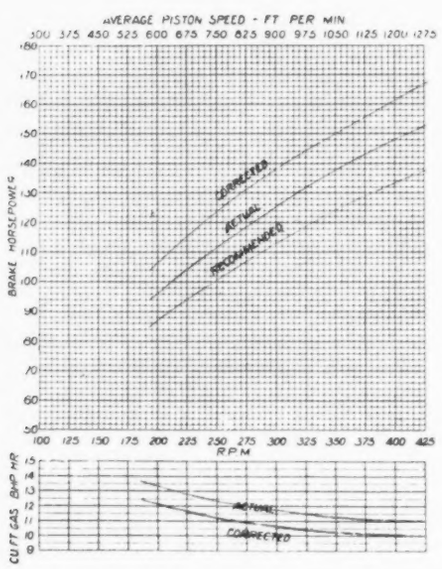
When writing RIDGE TOOL CO. *please mention The Petroleum Engineer*

NEW



The $14\frac{1}{2}''$ x $18''$ Type C

Two-Cycle Gas Engine



80 HP at 180 RPM
135 HP at 400 RPM

THIS engine, rated by cylinder size, possesses the inherent features of the smaller Type C engines. In addition, the $14\frac{1}{2}''$x$18''$ engine incorporates Timken Main Bearings, Eclipse lubricator for three-point cylinder lubrication, and a Robert Bosch Magneto. It may also be equipped with high pressure lubrication to crank and crosshead pin, and a lay shaft-driven, Timken-equipped water pump.

JOSEPH REID GAS ENGINE COMPANY
Oil City, Pennsylvania, U. S. A.
Distributed in all active fields

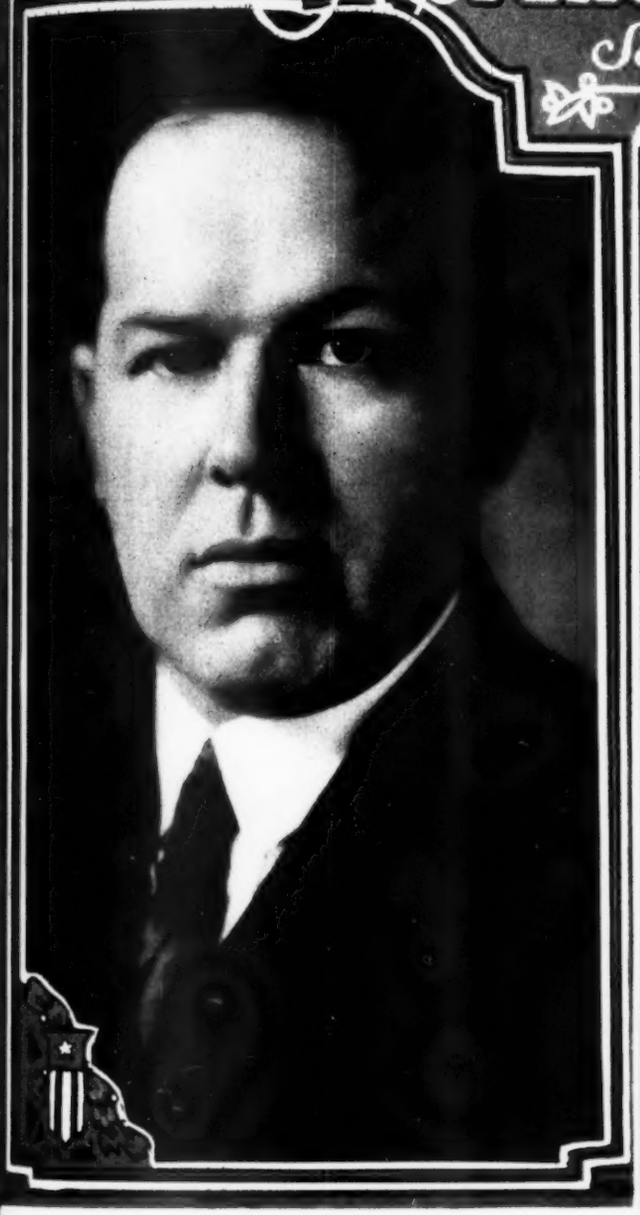
When writing Joseph Reid Gas Engine Co. *please mention The Petroleum Engineer*

PICTORIAL PETROLEUM

Monthly Rotogravure Feature of

The PETROLEUM ENGINEER

September, 1930



MESSAGE OF WILLIAM G. SKELLY TO EXECUTIVES OF THE INDUSTRY:

Gentlemen:

Based on my experience as President of the International Petroleum Exposition and as an oil company executive, I am here urging you to send as many men as possible to the Exposition this year in Tulsa, October 4-11. Last year, as in previous years, we were among those companies that sent large delegations of employes to the Exposition, having a large number of our men visit the Oil Show at different times.

By a careful analysis of the results obtained from these visits we have found that the savings effected in our organization by new methods and ideas derived from the exhibits at the Oil Show have been worth many times the expense of sending the men to the Exposition.

We accomplish the best results by having our men make reports upon their return to their different fields as to what they saw of value at the Exposition and how it could be applied to our operations. These reports reveal a great many characteristics in the men which in general prove that the workmen as a whole desire to go forward.

The Exposition affords a rare opportunity for men from the various fields to exchange experiences and ideas, renew old friendships and generally get together for mutual profit and entertainment.

You are of course aware that the International Petroleum Exposition and Congress is a non-profit making organization and its aim is entirely of an educational nature and therefore the support that you lend toward making the Exposition and Congress a success is support lent to make the oil business a success.

You will be interested in learning that prospects for an unprecedented number of delegates from foreign nations are such that the American Express company, the White Star Line, and the American Line, are devoting much of their activity in foreign offices to arranging a special itinerary for over-seas visitors.

A portion of our message distributed throughout Europe from London, reads:

"For 1930, in addition to the large exhibits of production and transportation material, special attention will be paid to the marketing and refining division of the Congress, and to the demand of this branch of the industry we have built a new building to house exhibits of this type. This is in addition to our already installed exhibit spaces now numbering over a thousand.

"The petroleum industry today is undergoing a new revolution—drilling methods are changing rapidly to rotary type of drilling, necessitated by the deeper sands. This also brings in higher pressures, greater volumes, question of crooked holes and hundreds of other problems which must be met and solved yearly. Here you can study in a practical manner all of these problems and find their solutions."

The American Petroleum Institute, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the United States Bureau of Mines, the United States Department of Commerce, a score of state geological surveys, societies of geologists, chemists and physicists, are included in the major program of the Exposition.

Trusting that these facts will convey to you our conviction that this year's Exposition and Congress will surpass anything of its kind in history, I shall look forward to finding your organization well represented at the "World's Fair of the Oil Industry."

Yours very sincerely,

W. G. Skelly

THE GENERAL MANAGER OF THE INTERNATIONAL PETROLEUM EXPOSITION TO THE MEN OF THE OIL INDUSTRY:

Gentlemen:

The thrilling experience of the miner who finds the thin vein of precious metal suddenly widened into a bonanza, is one we can appreciate. Of course we knew that this year the attendance mark set up in 1929 would be passed, but we hardly expected that events would justify our speaking about probable attendances of 150,000 or 175,000.

If we had not been so busy it might have occurred to us that extraordinary happenings were in the offing when a check revealed all of the available booth space, including that provided in two 240 by 60 feet buildings erected this year, sold out nearly four months before the oil show dates, October 4-11.

We also discovered the interesting fact that while the usual percentage of exhibitors who present displays for two consecutive years is sixty, this year this percentage has risen to seventy-five. However, the percentage of new exhibitors is not cut down proportionately because the size of the Exposition plant has been increased twenty-five per cent.

Without lessening emphasis on the production end of the industry the marketing and refining branches have been raised to prominence. One of the new large structures will be devoted exclusively to the displays of marketers and refiners, and matters of special interest in these branches occupy a prominent place on the oil show program. The California building is the result of the good relationship which has grown up, through the Exposition, between manufacturers and operators in the Mid-Continent area and those of the California fields.

Our correspondence gives us assurance that the work of our government in inviting representatives of fifty-two foreign nations, and that of the American Express, the White Star Line, and the American Line, and that of interested over-seas corporations, in giving publicity to the "World's Fair of the Oil Industry," will result in an unprecedented attendance of foreign delegations.

The exhibitors are interested in drawing the key-men of the oil business to the Exposition, and to this end most of the efforts of the oil show management have been directed.

Aside from the splendid support given by the trade magazines, we find that the newspapers, from California to Maine and abroad, believe that information about the Exposition is of interest to their readers. Through the kindness of the Skelly Oil Company and the Barnsdall Oil Company, the oil show will have access to broadcasting time over the National and the Columbia radio chains. The Arkansas-Louisiana Pipe Line Company will give "time" over two Shreveport, La., stations. Other radio stations expected to follow their custom of giving time are KVOO, Tulsa; WFAA, Dallas, and WOAI, San Antonio.

The exhibitors themselves have shown a fine spirit of co-operation and are assisting the management by including oil show folders in their mail, and by displaying Exposition posters.

Consider us at your service in promoting the interests of the oil and gas industry.

Yours very truly,

WHY YOU SHOULD ATTEND THE OIL EXPOSITION

The International Petroleum Exposition affords the greatest opportunity for an exchange of ideas today when the oil industry as a whole is feeling the results of new machinery and changing methods.

The American Petroleum Institute feels that the Exposition has a definite place as a show window for the equipment and processes which have been developed in carrying on the production, refining, and marketing of petroleum.

Not only is the Oil Show international in scope, but it also provides a common meeting place for the various branches of our industry. The Seventh Exposition and Congress to be held at Tulsa from October 4 to 11 will include for the first time a complete display of refinery and marketing equipment.

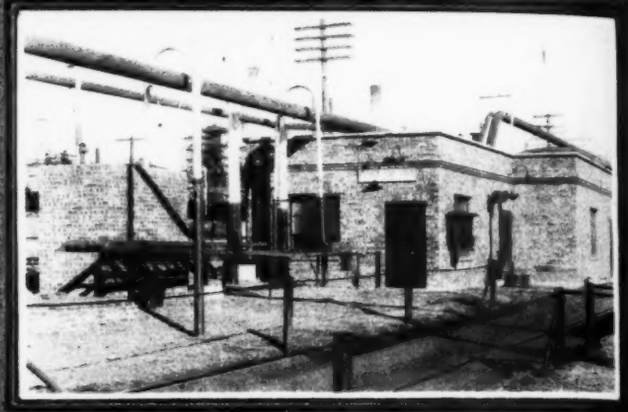
In this day of specialization it is important that we keep our view point wide enough so as not to lose track of the fundamental economic principles that are the basis of the oil business.

Many old friendships will be renewed during the coming Exposition and at the same time a greater understanding of the workings of each allied branch of the industry should result in the mind of each visitor.

C. A. Prichard (left) purchasing agent Mid-Continent Petroleum Corp., Tulsa, and Claude Lane, purchasing agent, California Co., Dallas, Tex.

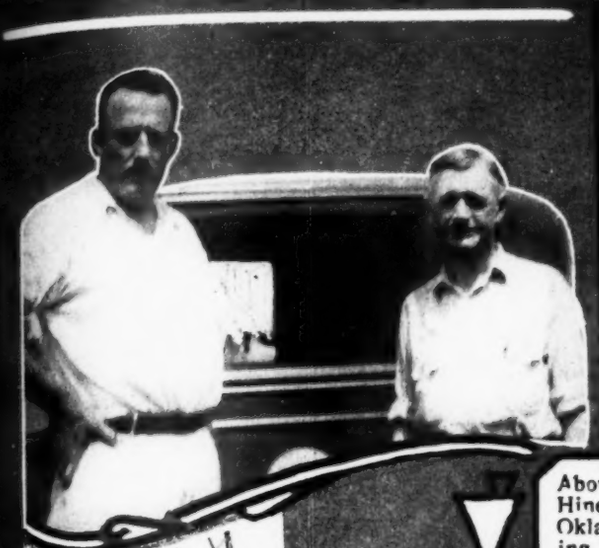
Part of shipment recently made by Gaso Pump & Burner Mfg. Co., Tulsa, Okla., of 32 pumps to Amtorg Trading Co., U. S. S. Russia.

Group of Gypsy Oil Co. operating men at Drumright, Okla. The gentleman in the foreground, wearing a coat, is W. H. Bettes, district superintendent of production.



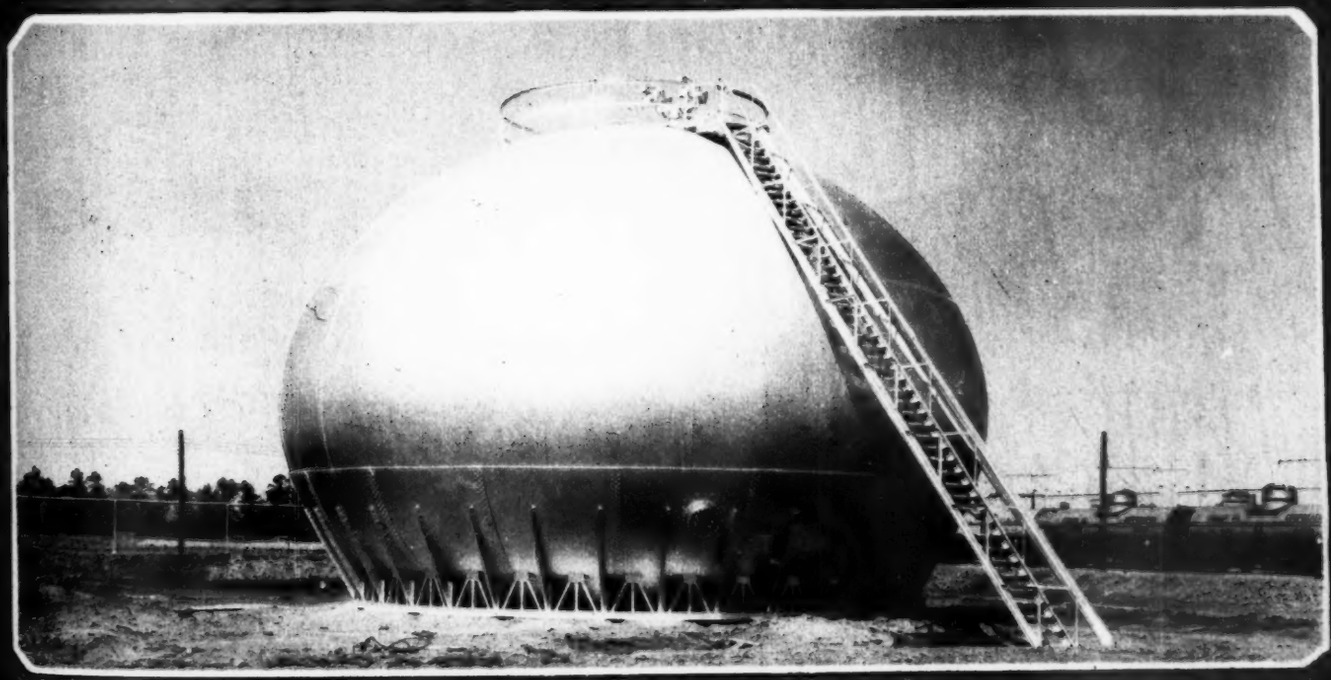
Foamite pump house No. 2 at Continental Oil Co.'s Ponca City, Okla., refinery.

Airplane view of 6,000-bbl. refinery, Hamburg, Germany, designed and built by Arthur G. McKee & Co., Cleveland, O.



Above, left—H. A. "Cv" Axtell, district supt. (left) and H. H. Hines, district foreman, Magnolia Petroleum Co., at Davenport, Okla. Above—First cannon ever used in Mid-Continent for shooting large tanks when on fire to afford a quick exit for the oil. Below—Southern Mill & Manufacturing Co.'s office and plant, Tulsa, Okla.

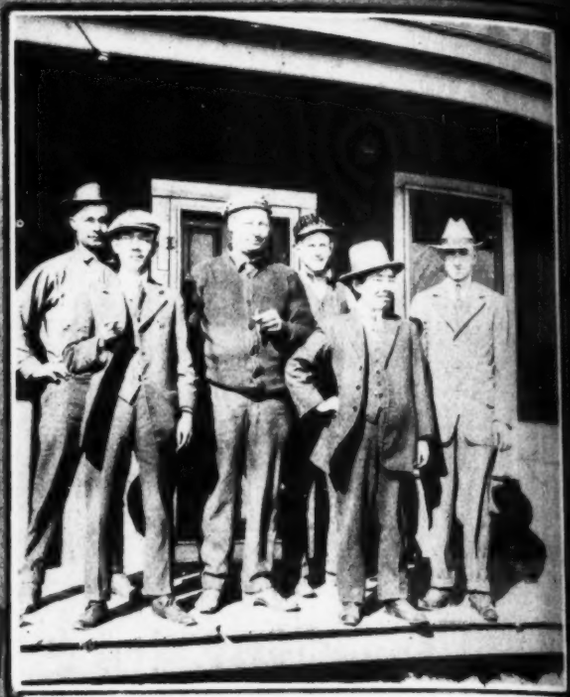
Combs-Worley No. 3, Humble Oil & Refining Co., Gray county, Texas. This well was drilled with Lufkin equipment shown in the photograph.



10,000 bbl. Hortonsphere built by Chicago Bridge & Iron Works for Phillips Petroleum Co., at Houston, Tex.

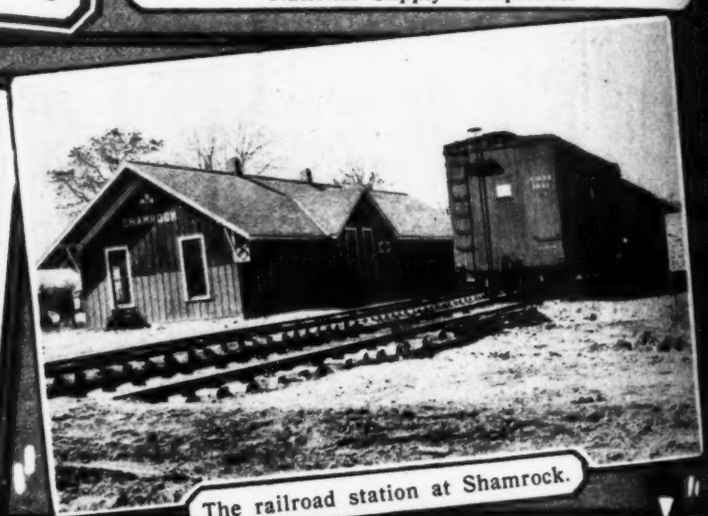
Main street in Drumright, Okla.

ON THESE TWO PAGES ARE SCENES DEPICTING THE EARLY DAYS OF THE OIL INDUSTY IN OKLAHOMA. ~ ~ ~ ACKNOWLEDGMENT IS MADE TO F. R. BRAMAN MID-CONTINENT REPRESENTATIVE FOR NATIONAL TUBE CO., WHO KINDLY LOANED US THE PHOTOGRAPHS. ~ ~ ~ ~ ~ ~



Headquarters of Joe Burns Drilling Co., Dilworth, Okla., Burns (now deceased) is the big man with a cigar in center of photograph. The dude on the extreme right is the Blackwell store manager of The National Supply Companies.

A "rag" bank at Shamrock, Okla. Wouldn't this be pie for the Chicago machine gun gentry.



The railroad station at Shamrock.

Main street crossing at Drumright, Okla. Careful ladies! Looks like Sir Walter Raleigh is out of town.

Cushing skyscrapers in the early days.

An oil fight at Blackwell. Center rig is on strip 30 feet wide and a half mile long. Other two rigs are owned by different companies.

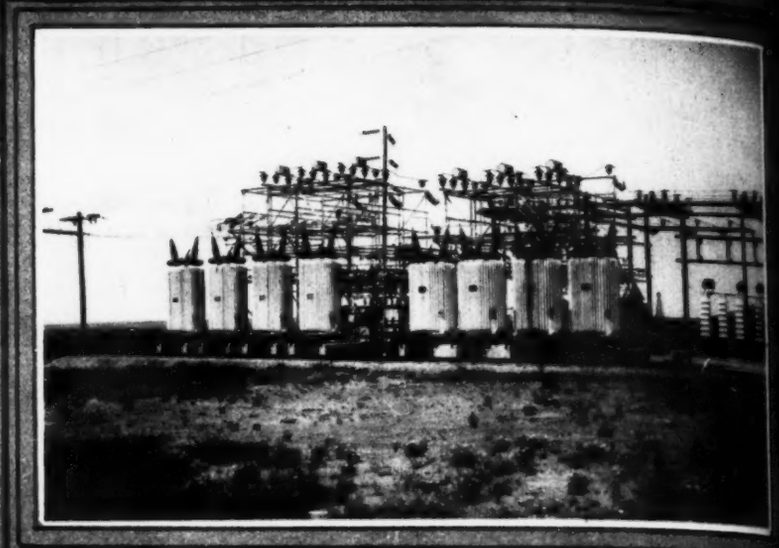
No, this has not been freshly ploughed for cotton planting, but is Main street, Cushing, after a rain and a day of heavy trucking in the early days.

The National Supply Companies' store at Cushing. Delivery to the field of the material stacked in front of the store was delayed three weeks because of the impassable condition of the roads.

Decorations on this street are because of a Fourth of July celebration and not in honor of the moving of the bit of early American architecture by man power.

An old landmark in Cleveland, Okla. Yes, it's an old distillery and at present, we imagine, is shut down.

Santa Fe station at Drumright. Note transportation facilities. Wouldn't last long hauling the heavy equipment used nowadays.



Left—Harry C. Pitchford, Irvine, Ky., manager in that state for Bradford Supply Co. Above—One of Texas Electric Co.'s sub-stations in West Texas.

Malcomb Cutting (now deceased) an old Bradford boy, who was considered one of the best drillers in the country. Mac Cutting drilled all over the Mid-Continent and Eastern fields, besides spending some 15 years in Roumania and India for the Standard Oil Co. He died in Roumania about six years ago.

F. G. Fellows, superintendent, Continental Oil Co.'s refinery at Ponca City, Okla.

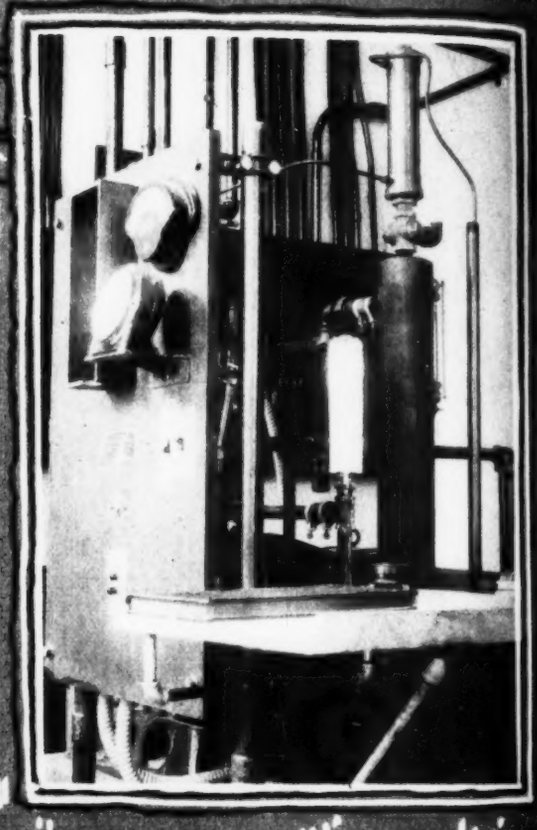
Midland Gasoline Co.'s plant at Coleman, Tex.

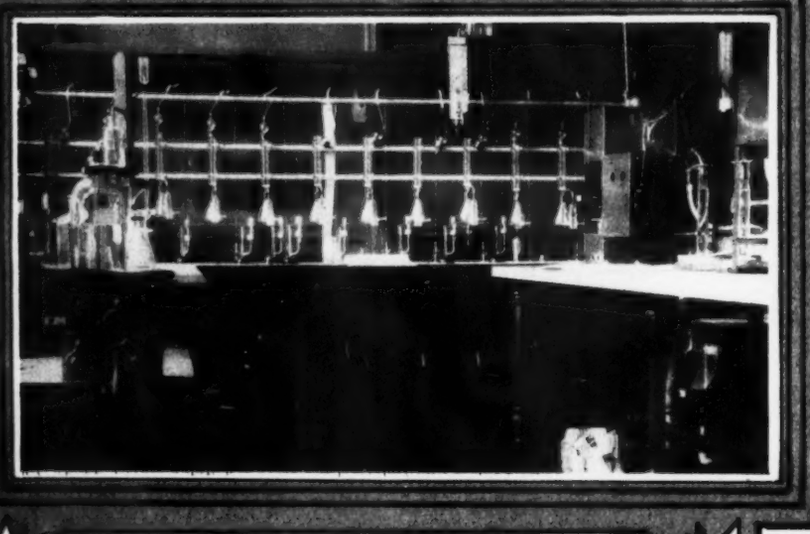
Magneto Ignition Corp.'s new offices and plant, Tulsa, Okla.

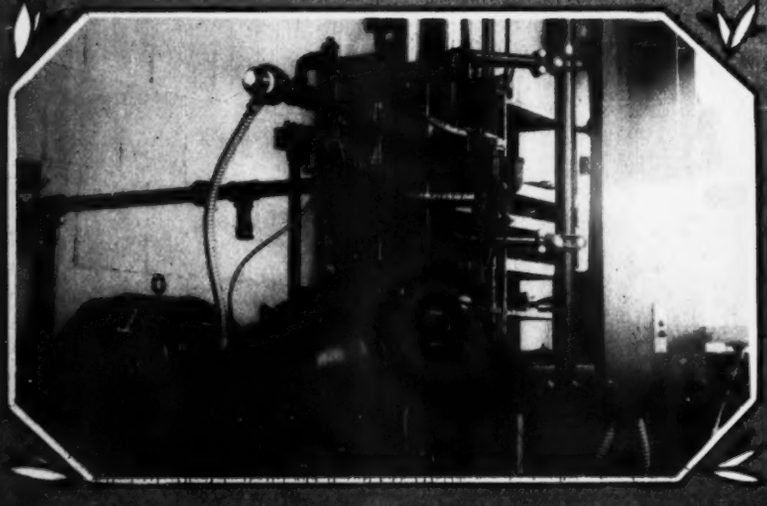
This view shows firemen pouring Foamite Generator Powder into the hoppers of Foamite Foam Generators. The powder is drawn down into the stream of water flowing through each generator and a chemical reaction takes place to form Fire-foam which is discharged on to the surface of the burning oil and smothers the flames under an air-tight blanket of heat-resisting bubbles of foam.

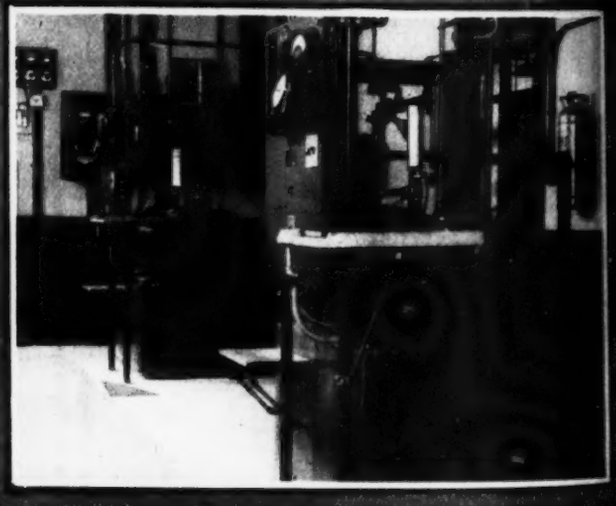
The fire photograph above shows Independent Oil & Gas Co.'s Fixico No. 1, taken in the spring of 1927. Below—Judging from the sign on this Oklahoma City well, it looks like open season on insurance agents. Below, right—Ben Newberry, purchasing agent, Lone Star Gas Co., Dallas, Texas. Right—This picture, taken in 1911, shows the shop of the Evangeline Iron Works, Ged, La. At the left is Blaine Johnston, now with Simms Oil Co., at Eldorado, Ark. Center—J. F. Cailloux, now president American Iron & Machine Works, Oklahoma City and, right, his helper.

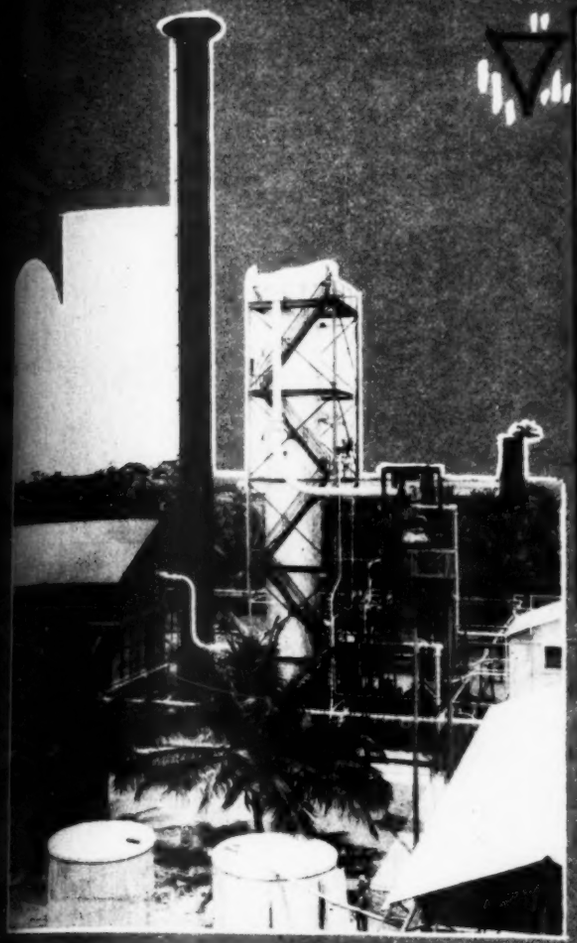
Photographs of personnel and equipment of Ethyl Gasoline Corp.'s new testing laboratory in Tulsa, complete story on which appeared in the August issue of The Petroleum Engineer. Upper left—Knock meter and electrolytic cell. Upper, right—Personnel—front row; left to right, Robert Graham, Elizabeth Colburn, J. G. Martin; back row, left to right, C. R. Bartholomew, H. L. McIntire, H. A. Mehler, Harold Shaw, H. N. Peters. Below—Sulphur analysis apparatus. Right and below, left—"Series 30" knock testing apparatus. Bottom, right—Knock testing room.

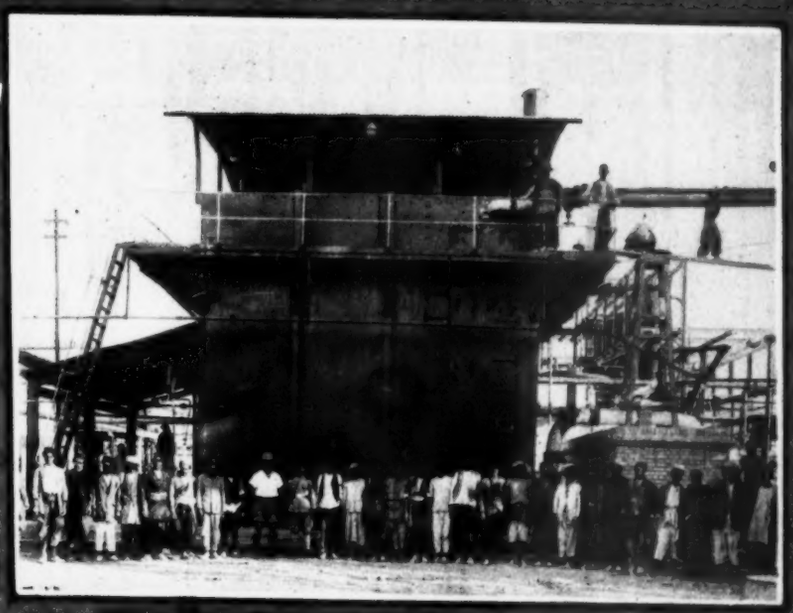




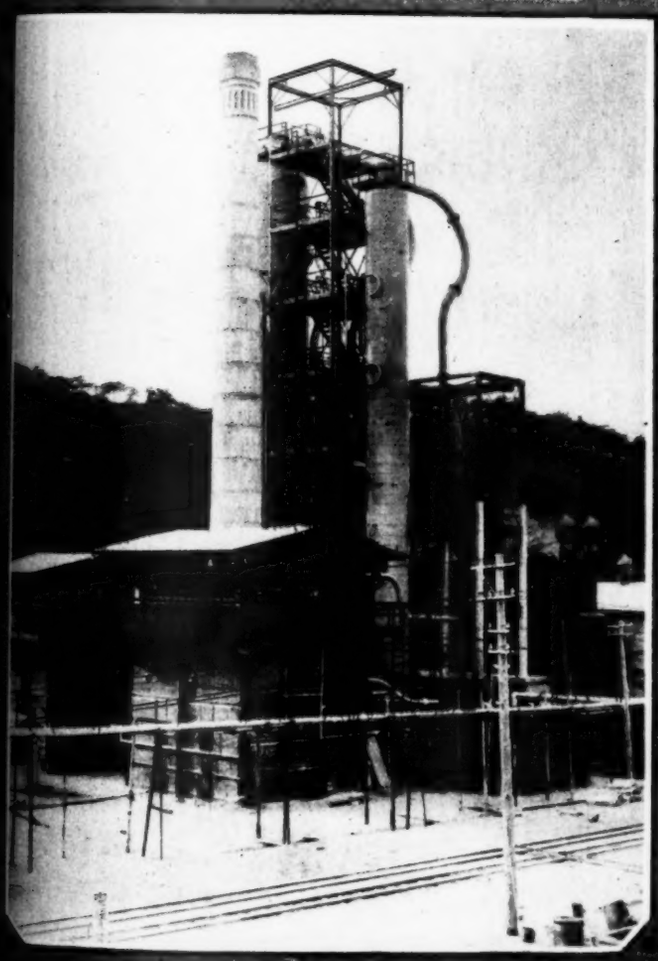


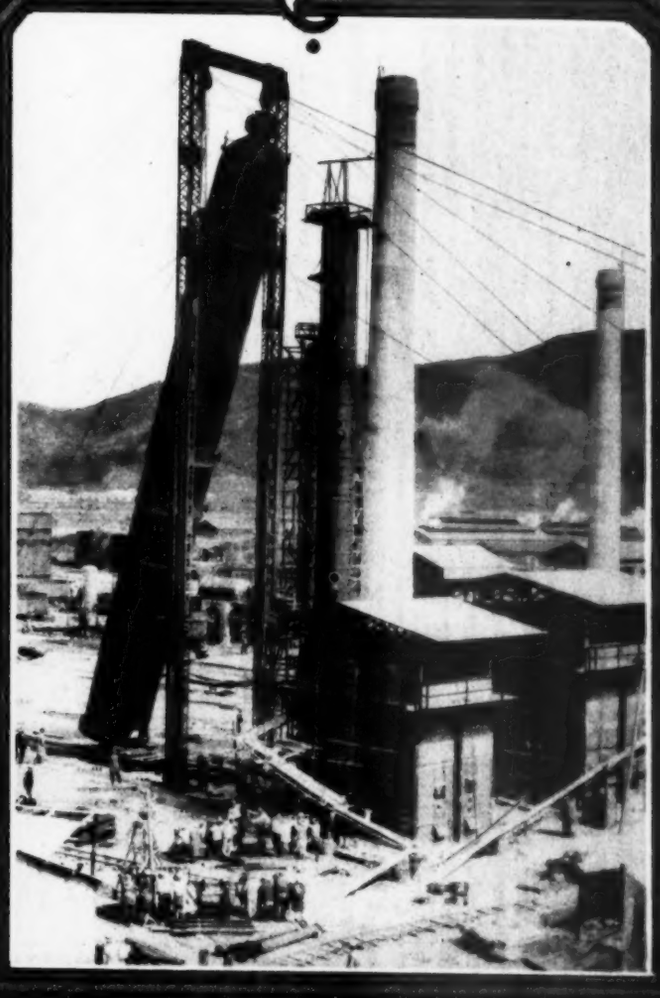


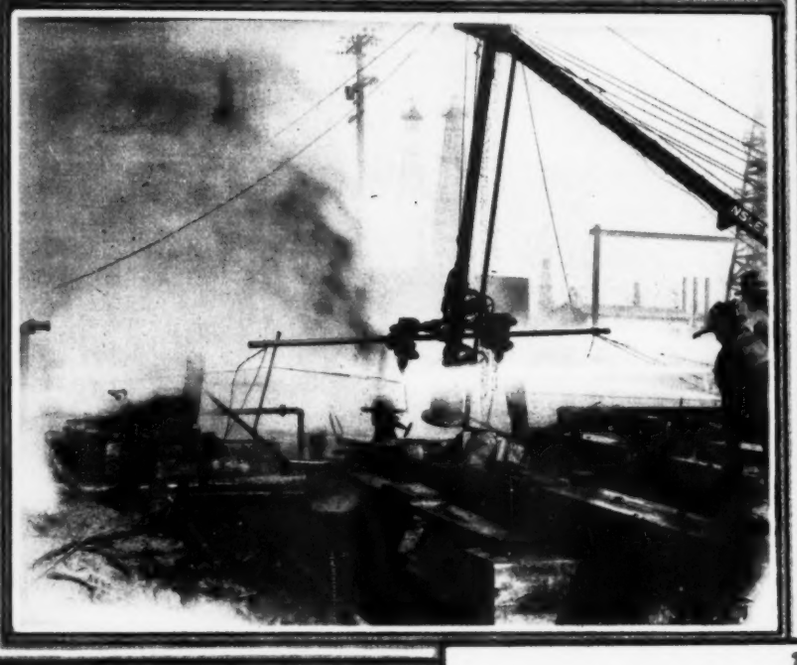




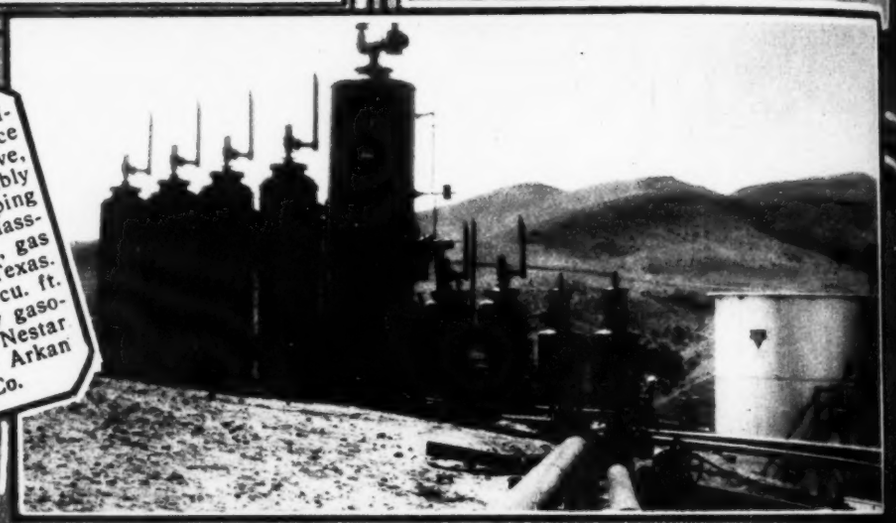
These photographs, which portray refinery installations in foreign fields were kindly furnished us by J. C. Glenn, of Foster-Wheeler Corp., designers and builders of the plants. Above, left—Atmospheric distillation units in South America. Above—Tube stills in Persia. Below, left—The erection of a distillation unit and (right) the completed unit.





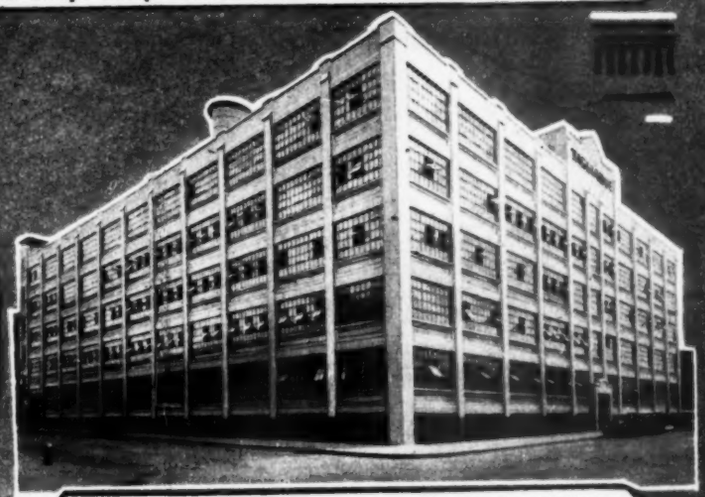


Above—Capping burning well in California. The crew is just about to place the Christmas tree on the well. Above, right—Double Christmas tree assembly in California. Right—Double trapping installation in California. Below—Glasscock Bros., Pettus Townsite No. 1, gas and gasoline well, Bee county, Texas. This well is producing 20,000,000 cu. ft. of gas and 30 bbls. of 76 gravity gasoline daily. Below, right—W. E. Nestar supt. of compressor stations for Arkansas-Louisiana Pipe Line Co.

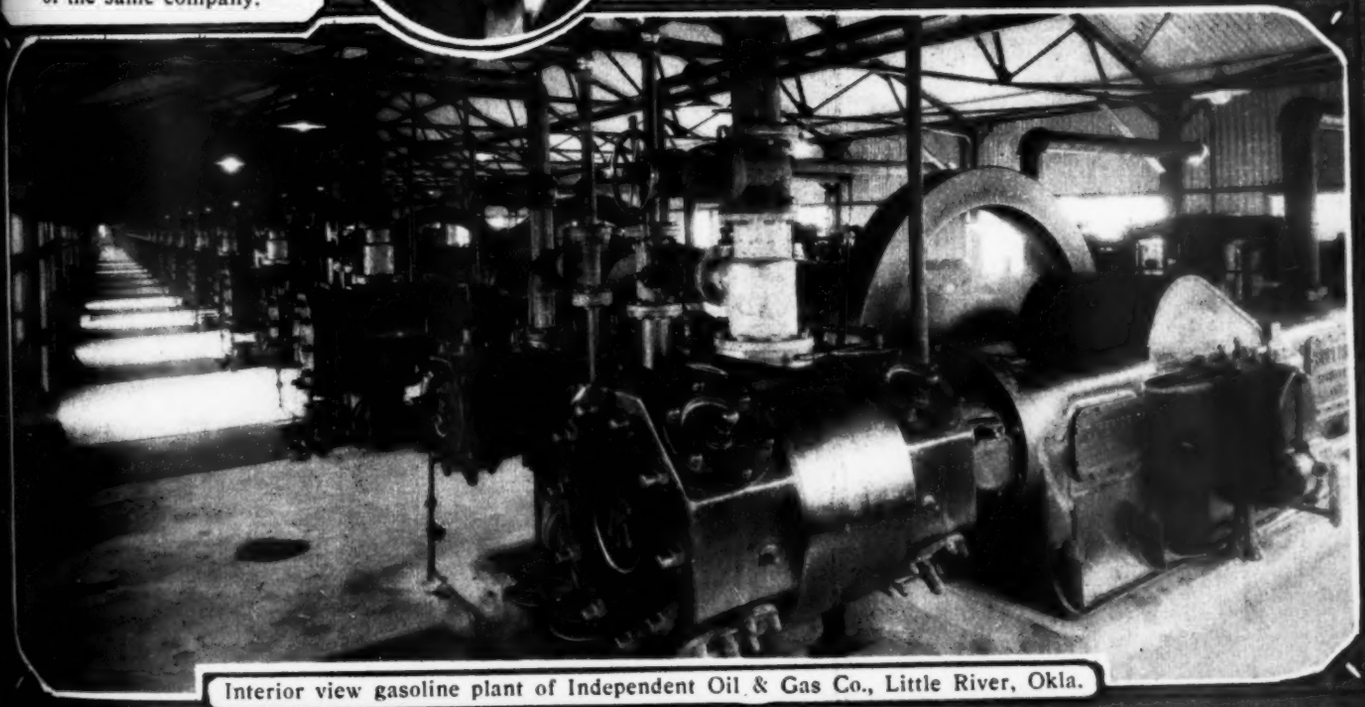


This picture of the Spindletop, Texas, pool was taken in 1902, shortly before the disastrous fire which swept every derrick shown out of existence.

Above—Tom Jones, president, Oklahoma Contracting Co., Dallas, Tex., and (right) Ray Johns of the same company.

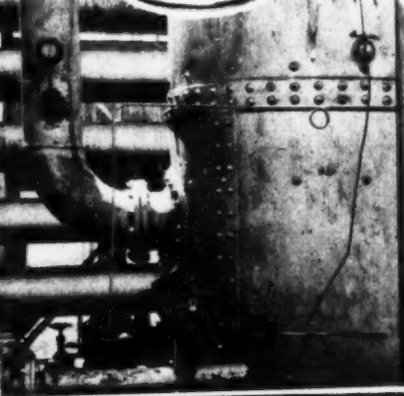


The new main office and factory of C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.



Interior view gasoline plant of Independent Oil & Gas Co., Little River, Okla.

A Texas Wildcat by Moonlight.

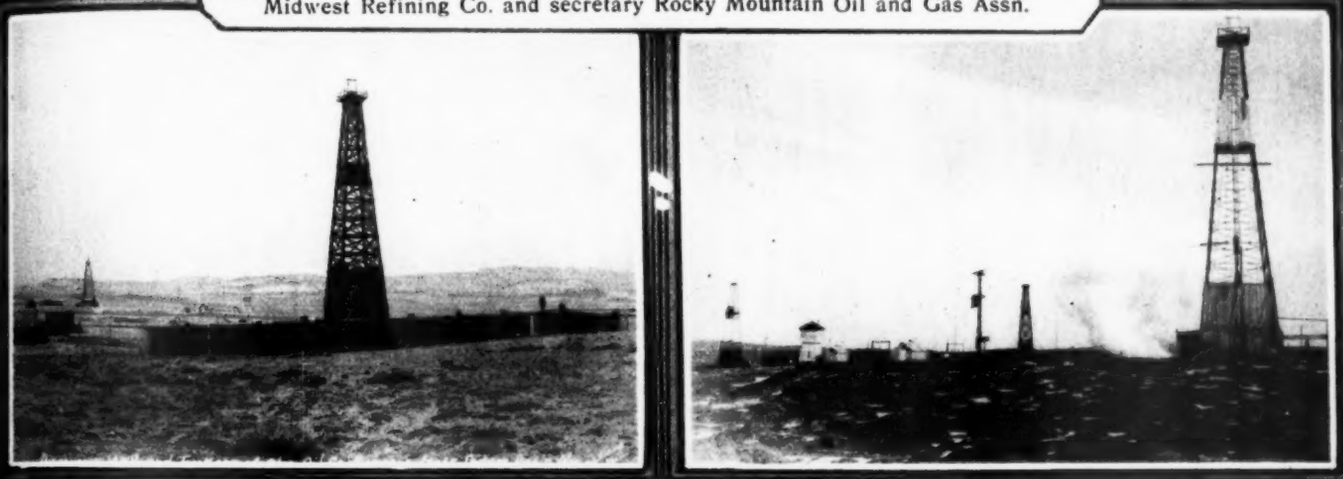


Upper left—H. J. Robertson, chief chemist, Pierce Petroleum Corp., Sand Springs, Okla. Above—Peter Vilkas (left) chief chemist and W. H. Nolan, asst. supt., of Producers & Refiners Corp.'s Tulsa refinery. Left—J. T. Dickinson, representing Oliver United Filters Co., Chicago, Ill.

Tagliabue automatic controller on reflux tower at Crosbie & Moran's Konawa, Okla., plant.

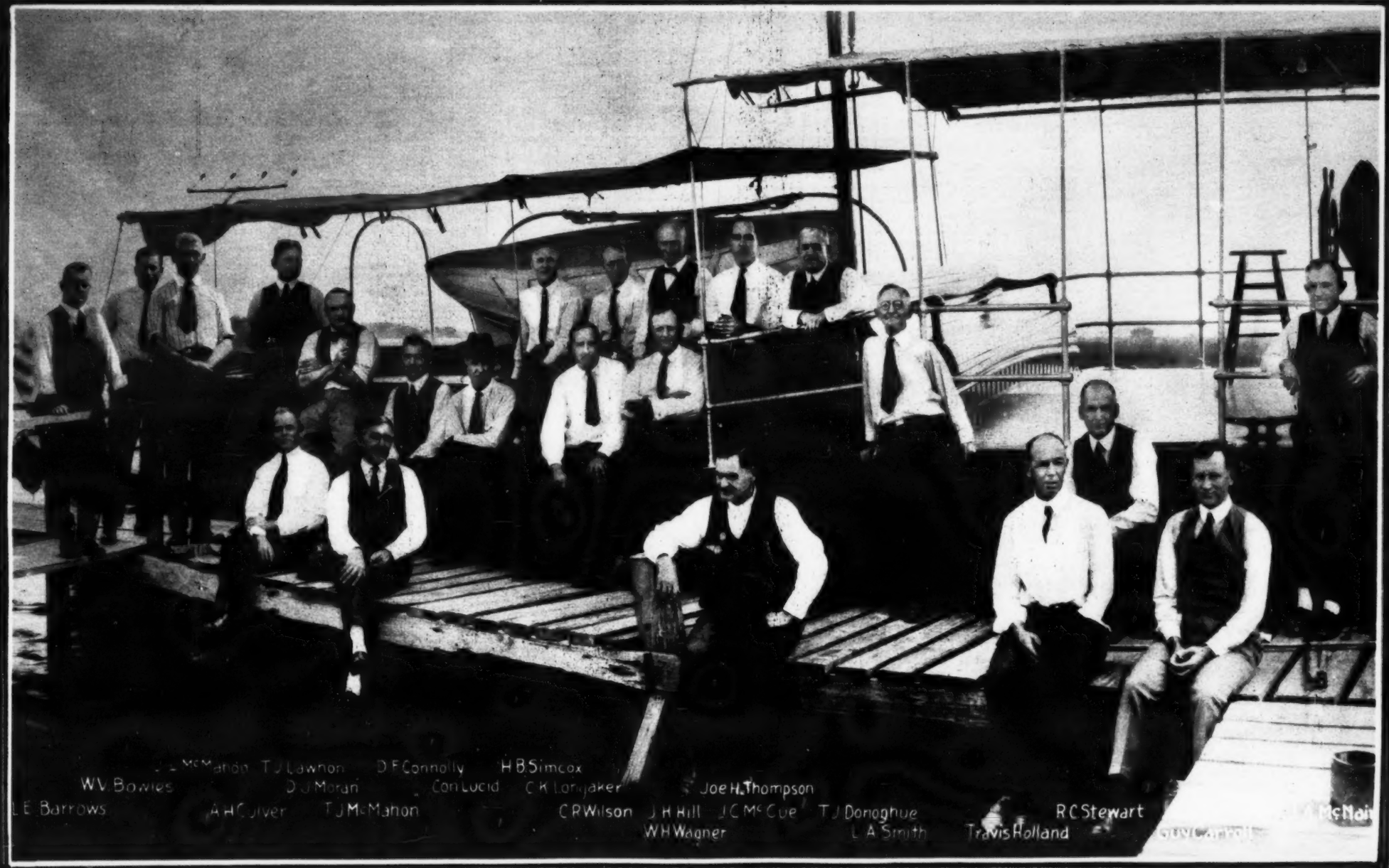
Barges at Mississippi River crossing taken during construction of Southern Natural Gas Corp's Birmingham line.

Left—L. L. Langworthy, pipe line construction engineer; center—Harry S. Bossart, assistant general production superintendent, both of Midwest Refining Co., and (right) D. W. Greenburg, editor Midwest Review, publicity director Midwest Refining Co. and secretary Rocky Mountain Oil and Gas Assn.

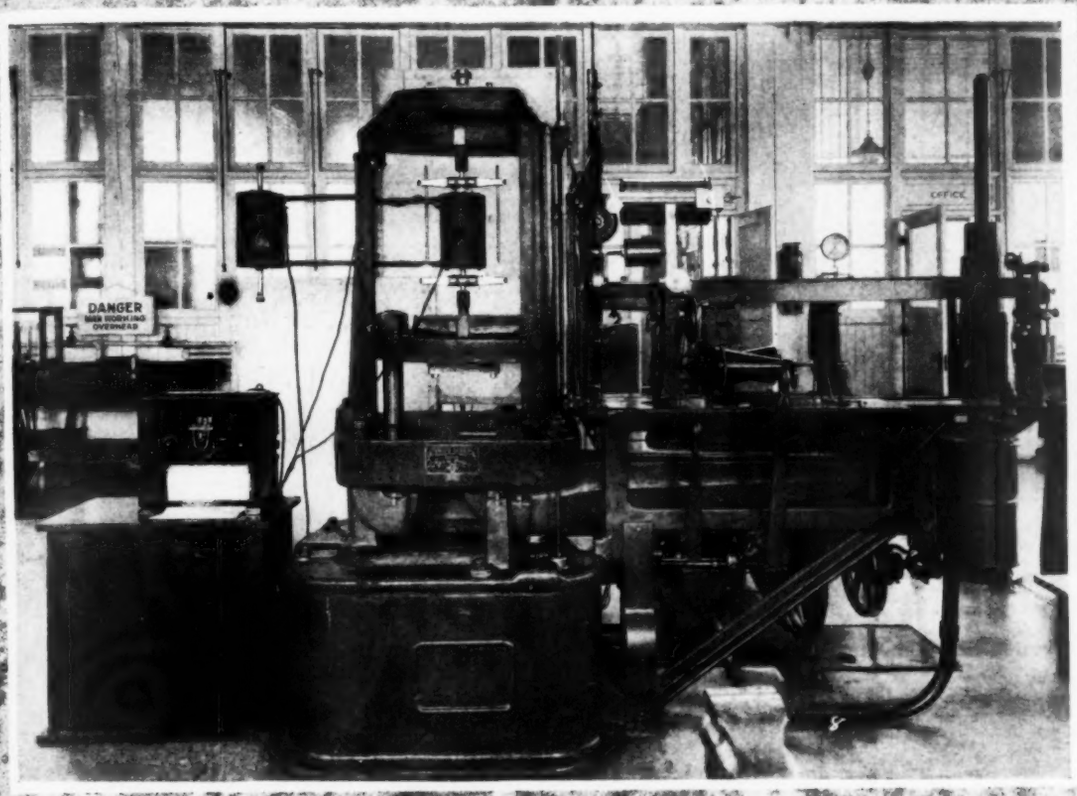


The two pictures above, taken by F. J. Hiscock, Cody, Wyo., photographer and sent to us by O. C. Major, Marion Machine Foundry & Supply Co., of that city, show the Ohio Oil Co.'s discovery well in the Oregon Basin, Wyo. This well was drilled in July 25, 1927. Frick Poe, superintendent of the Ohio Oil Co., was in charge of the work. On the right is shown Ora Summers No. 3, drilled in 1928 by the same company. In the background are seen the gas houses of the gas line which furnishes Cody, Wyo., with heat.

Airplane view Salt Creek field, 45 miles north of Casper, Wyo.



This picture, taken in the summer of 1921 in Houston, Texas, portrays a group of The Texas Company officials about to start on a cruise. D. J. Moran is now president of the Continental Oil Co. and H. B. Simcox is assistant manager of production of the same company. D. F. Connolly, Col. C. R. Wilson, J. C. McCue and L. A. Smith are deceased. All of the rest are still in the employ of The Texas Company.



It was only natural that the Petroleum Industry look to Hughes Tool Company to perfect a bit capable of coring even the hardest of formations.

The Hughes Core Bit, with interchangeable cutter heads, met this need and in so doing, further broadened the use and economies of the Rotary method of drilling.

Today Hughes Core Bits are used throughout the Rotary fields of the world—recognized leaders due to their safe, fast and certain core recovery.

HUGHES TOOLS
Sold by Supply Stores Everywhere

HUGHES TOOL COMPANY

Service Plants
Los Angeles, Calif.
Oklahoma City, Okla.

Main Office and Plant
HOUSTON,
TEXAS

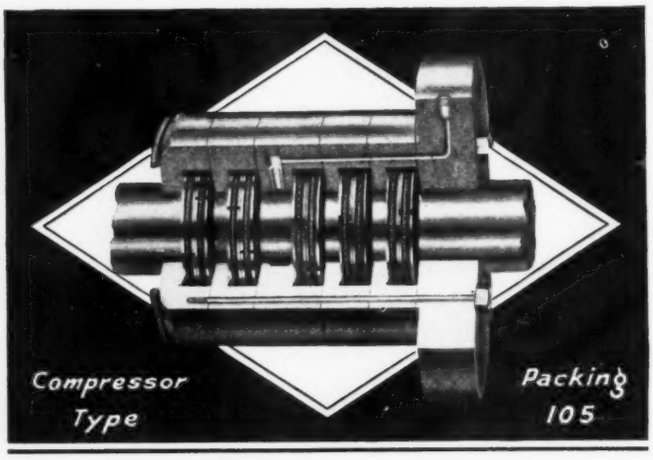
Export Office
Woolworth Building
New York City, N. Y.

When writing HUGHES TOOL CO. *please mention The Petroleum Engineer*

...production of the same company. D. F. Connolly, Col. C. R. Wilson, J. C. McCue and L. A. Smith are deceased. All of the rest are still in the employ of The Texas Company.

COOK'S GRAPHITIC IRON ROD PACKING

FLOATS WITH THE ROD



ELIMINATING THE THIRD BEARING

IN a reciprocating unit the angular thrust of the connecting rod is absorbed by the crosshead bearing. The cylinder acts as a bearing in carrying the Piston. These two bearings must be kept in perfect alignment else the interposed packing will act as a *third* bearing on the rod.

Perfect alignment is disturbed by wear, unequal expansion, faulty adjustment and vibration, any one of which causes a non-floating packing to act as a bearing. As this condition develops, friction increases, rod and packing wear is accentuated, and the packing leaks.

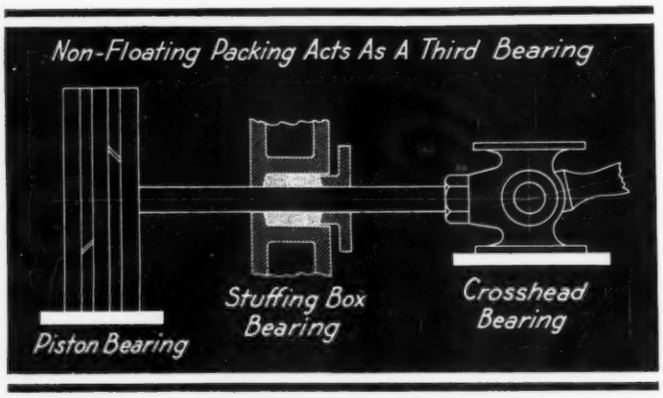
This trouble is completely eliminated in COOK'S Floating Metallic Packing as its design allows the packing rings to float with the rod. There is an improved type for all Air, Gas and Steam conditions.

Then, too, the wearing rings are made of Graphitic Iron, an exclusive material that aids in eliminating friction, and provides added years of service.

These exclusive features are being appreciated more and more as evidenced by the ever increasing use of COOK'S Packing by the leading operators in the oil and gas fields.

Ask for Catalog No. 129

"Sealing Pressure Since 1888"



C. LEE COOK MANUFACTURING CO.
INCORPORATED
LOUISVILLE, KY.
TULSA NEW YORK LOS ANGELES
Agents in Principal Cities

New Building for California Equipment and Engineering Show

UPON completion of the new 180-foot by 400-foot stucco building, a formal opening of the Permanent Oil Equipment and Engineering Exposition was held on August 15 in Los Angeles. Many representatives from foreign oil companies, as well as from those in the United States, attended the opening and, together with the various equipment manufacturers, were entertained by music, dancing and refreshments.

The new exposition building with the surrounding grounds has been erected to take care of the Second Annual Oil Equipment and Engineering Exposition as well as the permanent one. In floor area it is 72,000 square feet, or about one and three-quarters acres. It provides 245 well-housed booths, the majority of which are 10 feet by 20 feet, with a few of the smaller 10 foot by 10 foot spaces. All derrick and heavier equipment displays will be set up on adjacent outside spaces which cover an area of more than three acres. Everything about the exposition has been designed to take care of increasing requirements and additions to the building will be made as they become necessary.

Boye Studio
E. G. Lenzner

Both the permanent and annual expositions are under the direction of E. G. Lenzner, who managed the first annual exposition last March and which gained an international as well as national reputation. A valuable service will be rendered to the exhibitors by the constant attendance of a man experienced in oil and gas operations and equipment. Representatives from foreign oil companies will be contacted when in the territory and will be transported to the permanent exposition at all times. This particular attention which is paid to the foreign oil industry will render a valuable service to the exhibitors in facilitating their export business. Appointments will be made for all visitors to meet the various equipment manufacturers who are showing their products.

A technical manager, W. J. Blankenship, will furnish an all-year service to the exhibitors and will be available at all times to show the equipment and explain its features. He will be familiar with each piece, but will not offer recommendations.

Every facility is offered manufacturers of tools and machinery for use in drilling, production, transportation and refining to display their equipment at any time suitable to the oil company representative who wishes to inspect it. The service offered by the permanent exposition also includes the complete registration of all visitors, a complete list of foreign buyers, a weekly list of foreign buyers who are visiting the fields and the free mailing out of circulars for exhibitors to all foreign oil companies and their important personnel.

Greatest Wildcatter Dies

Thomas B. Slick

THE oil industry lost one of its most colorful characters upon the death of Thomas Baker Slick last month. He will long be remembered for his part in the development of Mid-Continent oil fields, especially those in Oklahoma, where he is credited with the discovery of several important producing areas.

Mr. Slick, until his death at Johns Hopkins Hospital, Baltimore, Md., was actively carrying on the banner of the independent wildcatters. There perhaps have been few, if any, persons connected with the oil industry with the courage to carry out their convictions and beliefs with the daring, dynamic efforts that were so characteristic of Mr. Slick.

He came to the Mid-Continent area from Clarion, Pa., his boyhood home and obtained employment as a clerk in an oil field supply house at Chanute, Kansas. In 1907 he moved to Oklahoma where he was active in leasing. His first big strike was in the Cushing field, where his properties brought a price of $2,500,000.

Tom, as he was called by nearly everyone, made his last great appearance in national news early in 1929 when he sold all his production and a half interest in his undeveloped acreage to the Prairie Oil & Gas Company for an unofficial figure of slightly over $30,000,000. With relentless efforts that followed him throughout his life his production was greater at his death than before this sale.

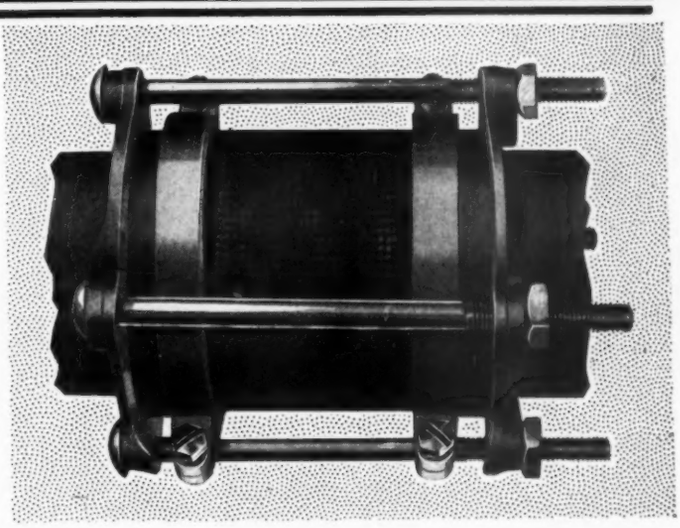
Arthur A. Beard Dies Suddenly

TWO days after he was suddenly stricken with appendicitis, Arthur A. Beard, former vice-president and general manager of the Tidal Oil Company and widely known drilling contractor and oil producer, died recently in a Tulsa, Oklahoma, hospital. He was 50 years old.

Born in Decatur county, Indiana, Mr. Beard came to Oklahoma 20 years ago and was connected with the Frank Phillips interests at Bartlesville until 1916. When the Tidal Company purchased a large block of producing property from Phillips, Beard came to Tulsa as production superintendent for Tidal.

He was later made vice-president and general manager, retaining that position until May 1, 1929, when he resigned due to his physical condition. Immediately after his resignation he spent several weeks at his summer home at Bella Vista, Ark., and then returned to Tulsa and entered the drilling and producing business.

At the time of his death he was associated with Beard and Hammond, Inc., drilling contractors; Haskell, McCreery and Beard, Inc., oil producers; Beard and Elliott, oil well supply firm, and Arthur A. Beard, Inc., oil producers and drilling contractors.



SKINNER
COLLAR LEAK
CLAMP for Repairing Leaky Collars

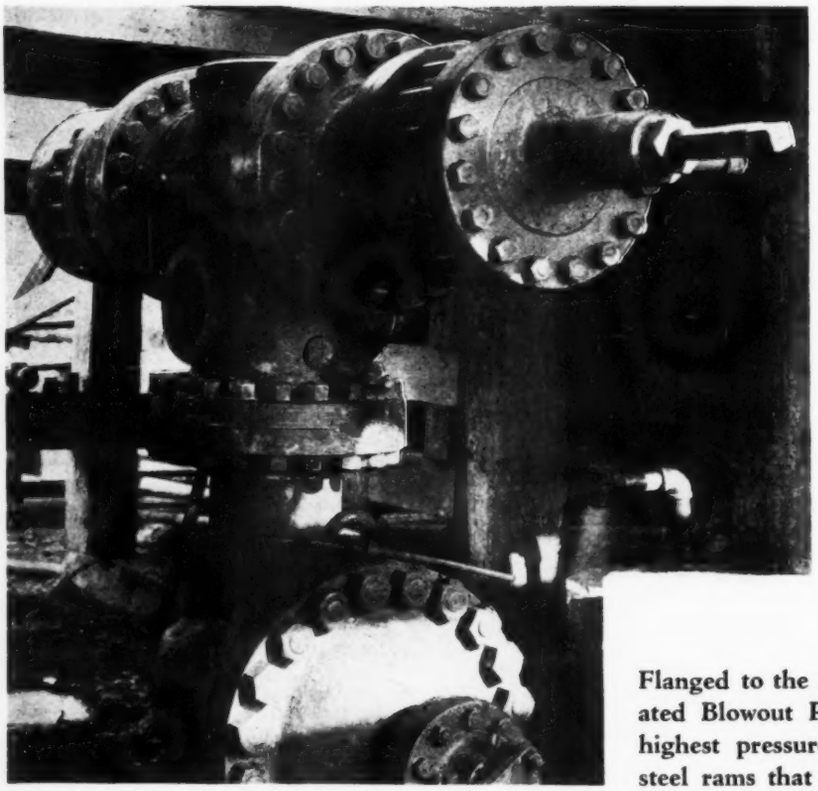
This clamp—operating on gland and stuffing box principle—shapes the rubbers to the job. Not dependent on collar recesses, as the gasket container rings guide the rubbers, always inward, into the leak. The Skinner Collar Leak Clamp is particularly valuable on rough or uneven collars. Made of malleable iron, for any pressure.

In stock at all supply stores.

M. B. SKINNER COMPANY
Sample St. at Falcon St. South Bend, Ind.

SKINNER

ON GUARD



below

THE DERRICK FLOOR . . . . .

ALWAYS READY TO PREVENT THE MAD RUSH OF UNLEASHED HIGH PRESSURE

C · I · W
STEAM OPERATED BLOWOUT PREVENTER

Is the only Blowout preventer giving you these three vitally important factors of blowout prevention:
Remote Control By Steam,
Instantaneous Closing,
Steel Around Steel Grip.

Flanged to the last string of casing the C-I-W Steam Operated Blowout Preventer is a master of all below it. The highest pressures succumb to the mastery of its powerful steel rams that instantaneously grip like a vise around the drill stem by merely opening the 4-way operating valve.

The drill stem is positively and securely held and packed off by a simple mechanical means. The amount or weight of drill stem is in no way a factor in holding pressure with this preventer.

At the first and slightest indication of a blowout, the 4-way operating valve, which is located at a safe and convenient distance from the well, is opened a quarter turn. The steel rams close with lightning speed around the drill stem. The auxiliary locking screws are screwed up, and another destructive well has been harnessed.

The C-I-W Steam Operated Blowout Preventer is always in position, always ready. No special attachments to put into place, just open the 4-way valve without any of the crew going near the derrick floor.

CAMERON IRON WORKS, Houston, Texas
Gentlemen:
Please send me your latest booklets and literature describing the operation and construction of the Steam Operated Blowout Preventer. Also your pamphlet, "How to Tube Wells Against Pressure."

Name .....
Company .....
Position .....
Address .....

CAMERON IRON WORKS, INC.

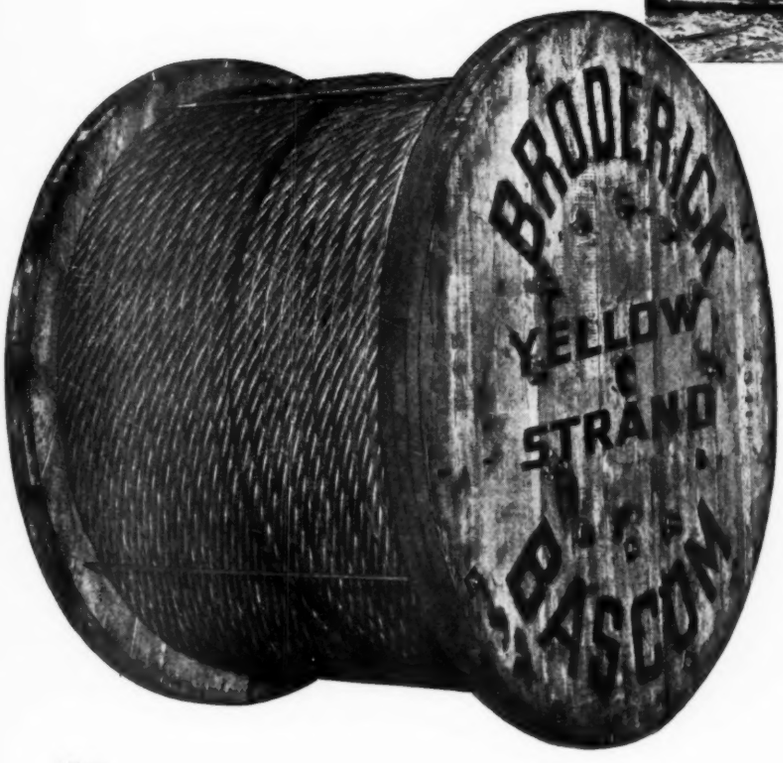
HOUSTON, TEXAS

Stocks at:
Petroleum Equipment Co., 2800 S. Alameda St., Los Angeles, Calif.; Bridgeport Machine Co., Oklahoma City, Okla., and Hobbs, N. M.; Hercules Supply Co., Hobbs, N. M. For sale by all leading supply stores.

When writing CAMERON IRON WORKS, INC., *please mention The Petroleum Engineer*

4907 Feet in Second Hole

. . . . and this Yellow Strand Line is Still Going Strong



NR694

AFTER this 1-inch Yellow Strand Rotary Line had finished one deep well for the Texas Company, they put her on their Landslide No. 262, Humble, Texas. At 4907 feet, when photo was taken, the line was still in good working condition.

Records like this have come to be *expected* of Yellow Strand. It is made of pure Swedish stock, the wire being drawn strictly to our specifications by famous, old established firms. In 53 years of rope making we have never met its equal for elasticity, combined with unusual wearing qualities and great strength. No wonder Yellow Strand survives hard usage.

Make no mistake. There *is* a difference between ordinary improved plow steel and Yellow Strand. Regardless of price, Yellow Strand Rotary Lines *cost less.*

Distributors of Yellow Strand and other B & B Drilling, Pumping and Sand Lines in all fields.

Ask for Catalog 53

BRODERICK & BASCOM ROPE CO.

St. Louis, Mo.

Factories: St. Louis and Seattle

Warehouses: New York, Portland, Houston

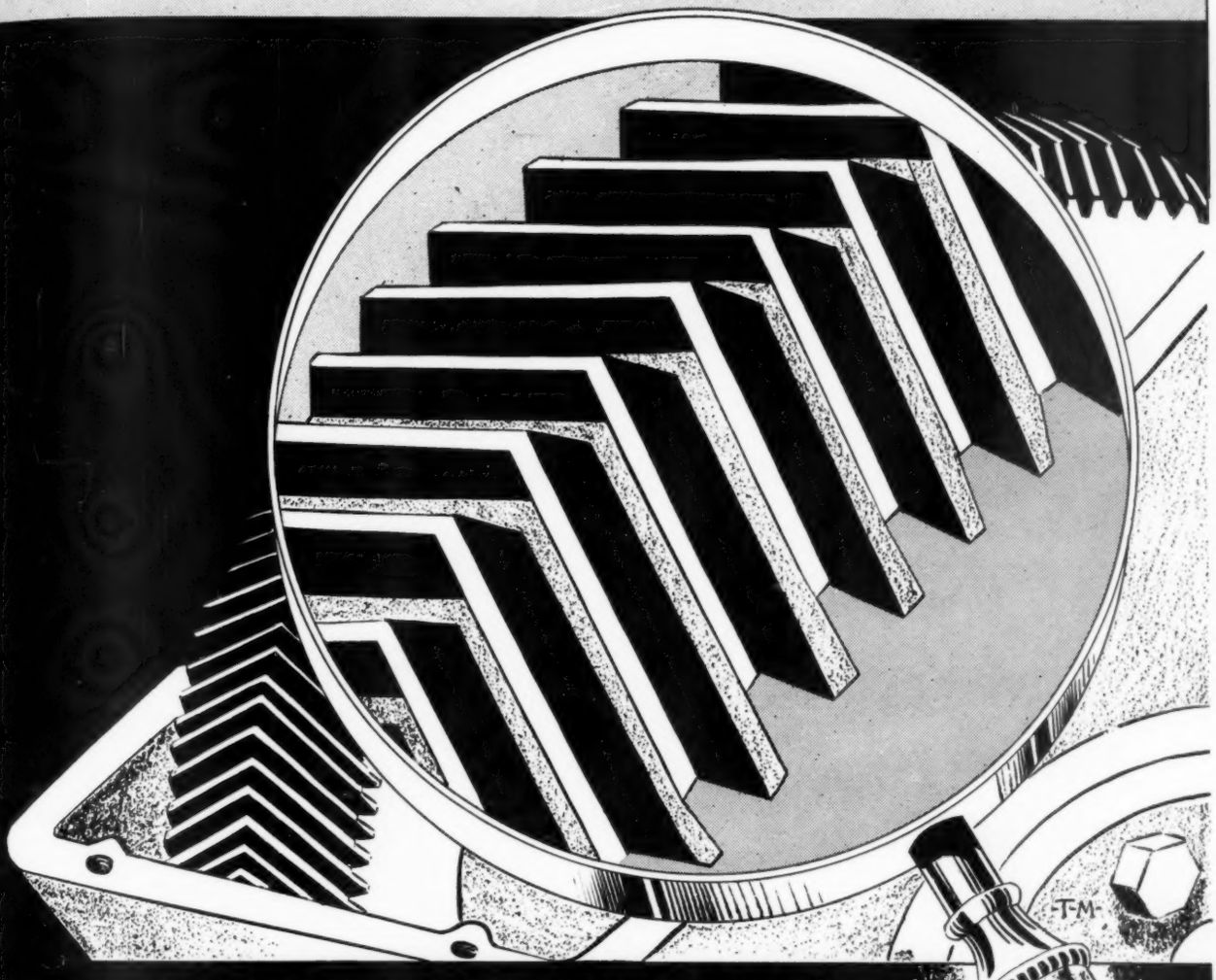
Yellow Strand Rotary Drilling Lines

When writing Broderick & Bascom Rope Co. *please mention The Petroleum Engineer*

INDEX *to* ADVERTISERS

	Page
A	
Abercrombie, J. S., Co.	
Acme Fishing Tool Co.	203
Ajax Iron Works	9
Allis, Louis Co., The	13
Allsteel Products Mfg. Co.	
American Meter Company	88
American Roller Bearing Co.	30
American Tank & Equipment Corp.	54-55 and 141
Andrews Steel Co.	
Atmore, Robt. N., Co.	26
Axelson Manufacturing Co., Ltd.	10
B	
Baash-Ross Tool Co.	145
Baker Oil Tools, Inc.	1
Baldwin-Duckworth Chain Corp.	107
Barnickel, Wm. S., & Co.	12
Beaumont Iron Works Co.	
Blackor Co.	27
Black, Sivalls & Bryson, Inc.	81-82
Braun, C. F., & Co.	14
Brewster Co., Inc.	208
Broderick Co., The	155
Broderick & Bascom Rope Co.	211
Brown Instrument Co.	95
Buckeye Traction-Ditcher Co.	186
Byron Jackson Co.	Back Cover
C	
California Talc Co.	17
Cameron Iron Works, Inc.	184
Campbell, J. A., Co.	199
Central Tube Co.	63
Chaplin-Fulton Mfg. Co., The	199
Charlotte Chemical Laboratories, Inc.	
Chicago Bridge & Iron Works	
Chicago Pneumatic Tool Co.	6
Clark Bros. Co.	57
Colona Division Pittsburgh Screw & Bolt Corp.	16
Continental Supply Co., The	105
Cook, C. Lee, Mfg. Co.	182
Cooper-Bessemer Corp., The	45
D	
Driftmeter, Inc.	
Dresser, S. R., Mfg. Co.	39
E	
Electric Controller & Mfg. Co., The	7
Elliott Core Drilling Co.	22
Exchange Banks of Tulsa	
F	
Fisher Governor Co., The	134
Fluid Packed Pump Co.	26
Fluor Corporation, Ltd., The	
Foster Wheeler Corp.	20
Foxboro Co., Inc., The	90
Franklin Valveless Engine Co.	79
Frick-Reid Supply Corp.	11
G	
Gaso Pump & Burner Mfg. Co.	Inside Back Cover
General Electric Co.	
Gott, H. P., Mfg. Co.	195
Gray Processes Corp., The	103
Guiberson Corp., The	112-113
H	
Halliburton Oil Well Cementing Co.	119
Hanlon-Waters, Inc.	134
Hercules Tool Co.	
Hinderliter Tool Co.	86
Hughes Tool Co.	181
I	
International Derrick & Equip. Co.	48-49
International Petroleum Exposition	133
International Supply Co.	25
J	
Jackson Engineering Corp.	3
Jefferson Union Co.	43
Jensen Brothers Mfg. Co.	
Jones, S. M., Co.	193
K	
Kerotest Mfg. Co.	153
Key Boiler Equipment Co.	
Kirk-Morrow Iron Works Co., The	70
L	
Layne & Bowler Co.	187
Link-Belt Company	
Lucey Products Corp.	8
Lufkin Foundry & Machine Co.	
Mc	
McCord Radiator & Mfg. Co., Gasket Division	159
McCord Radiator & Mfg. Co., Lubricator Division	120
McEvoy, J. H., & Co.	194
M	
Marley Co.	
Mason Regulator Company	
Merco Nordstrom Valve Co.	18
Metric Metal Works	88
Midwest Piping & Supply Co., Inc.	
Miller Sand Pump Co.	
Miller, Max B., & Co., Inc.	Inside Front Cover
Moore, Lee C., & Co., Inc.	99-100
Murray Tool & Supply Co.	52
N	
National Equipment Corp.	127
National Supply Companies, Inc.	69
National Tank Co.	157
National Transit Pump & Machine Co.	67
Naylor Pipe Co.	110
Neilan Co., Ltd.	125
Norris Bros., Inc.	191
O	
O. C. S. Manufacturing Co., The	115
Oil Conservation Engineering Co., The	
Oklahoma Contracting Co.	
Oklahoma Gas & Electric Co.	74-75
Oklahoma Iron Works	25
P	
Parkersburg Rig & Reel Co.	188
Patterson-Ballagh Corp.	136-137
Peerless Supply Co.	150
Penberthy Injector Co.	28
Pennsylvania Forge Corp.	195
Petroleum Engineering, Inc.	
Petroleum Equipment Co.	202
Petroleum Rectifying Co.	41
Portable Rig Co., Inc.	148
Prescott Company, The	58
Producing Equipment Co., The	198
Q	
Quasi-Arc, Inc.	203
R	
Ratigan, J. P.	
Refinery Supply Co.	198
Regan Forge & Engineering Co.	201
Reid, Joseph, Gas Engine Co.	164
Republic Rubber Co.	2
Republic Steel Corp.	
Ridge Tool Co.	163
Robinson Orifice Fitting Co.	24
S	
Shaffer Tool Works	96
Sheldon Machinery Corp.	60-61
Skinner Bros. Belting Co.	
Skinner, M. B., Co.	183
Smith, A. O., Corp.	4-5
Smith Separator Co.	
South Chester Tube Co.	
Southern Cornice Works	202
Spang, Chalfant & Co., Inc.	197
Spang & Co.	46
Spencer Trailer Co.	
Sperry-Sun Well Surveying Co.	122
Stanwood Corp., The	129
Struthers Wells-Titusville Corp.	190
T	
Titusville Iron Works Co.	190
Trimont Mfg. Co.	84
Truman-Smith Construction Co.	64
Tube-Turns, Inc.	21
Tulsa Boiler & Machinery Co.	139
U	
Union Wire Rope Corp.	160
V	
Victaulic Co. of America	93
W	
Waukesha Motor Co.	
Westcott Valve Company	131
Whealton & Townsend, Inc.	206
Wickwire Spencer Steel Co.	19
Wico Electric Co.	23
Williams Bros., Inc.	
Williams, J. H., & Co.	51
Winkler-Koch Engineering Co., The	147
Y	
Youngstown Sheet & Tube Co.	117
Z	
Zero Hour Torpedo Co.	15

GASO PUMPS INVITE THE CLOSEST INSPECTION



Close inspection of Gaso Pumps reveals features which are reassuring to the purchaser—correct design in accordance with the most advanced engineering principles—materials carefully selected for suitability and quality—workmanship of an accuracy made possible only by a combination of complete mechanical facilities and workmen especially trained to Gaso standards of precision.

Gaso Pumps are built exclusively for the industry which is so crammed with action that conditions of usage are often severe in the extreme. And these pumps are built to deliver pleasing service in spite of the excessive demands to which they are subject.

Send your requirements for full information regarding Gaso Pumps to meet any oil industry need.

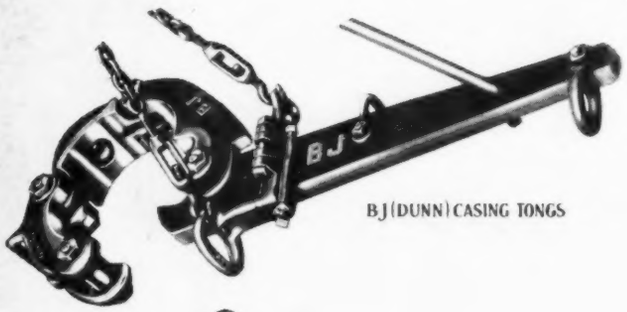
GASO PUMP & BURNER MFG. COMPANY, Tulsa, Okla.

Dallas, Texas — New York, N. Y.

for every oil industry need

When writing GASO PUMP & BURNER MFG. CO. *please mention The Petroleum Engineer*

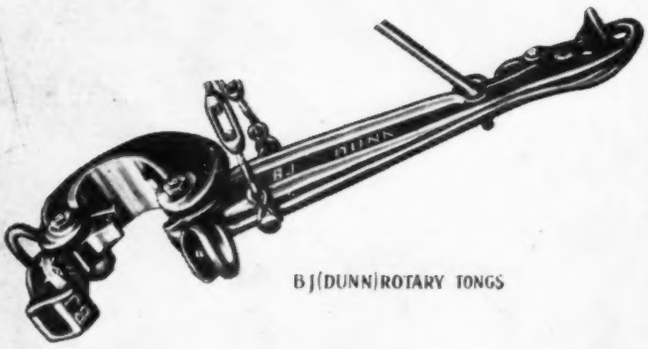
for every purpose under all conditions



B J (DUNN) CASING TONGS

B J (WILSON) ROTARY TONGS

B J (WILSON) CASING TONGS



B J (DUNN) ROTARY TONGS

BJ

Casing and Rotary TONGS

Under the names "Wilson Tongs" and "Dunn Tongs" these tools have been famous for years for Safety, Speed, Convenience and Economy. Their advanced design further developed by BJ engineers, meets every present day deep-drilling requirement.

BYRON JACKSON CO.

Established 1872

General Offices 2150 East Slauson Avenue LOS ANGELES, CALIF.

Tulsa Oklahoma City Houston Shreveport

New York City

PRINTED IN U. S. A.